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The Use of Condensers for Economizing Steam

How Costs of Power Plant Operation Can Be Reduced, With a Simple Explanation of What Can Be Expected From the Use of Condensers

By J S Rice

MANAGERS and superintendents of iron mines, furnaces and steel mills at present are giving a great deal of attention to the subject of power plant economy, but until recently this has been confined almost entirely to the prime movers and electrical machinery. In the case of steam units, recognition has been given to the advantages of operating condensing, yet this has been done only in a general way, and progress has been and still is hindered by the apparently conflicting claims made by the so-called condenser *experts*.

The essential facts can, however, be explained in plain terms, and, with these understood, any mechanical man can figure out approximately what to expect in the way of *economy* from condensers taking cooling water at certain temperatures and discharging it at others. It is the object of this article to explain such essentials.

The maximum efficiency possible for any heat engine is determined by dividing *the difference between* the absolute temperature at which the working fluid is received and the tem-

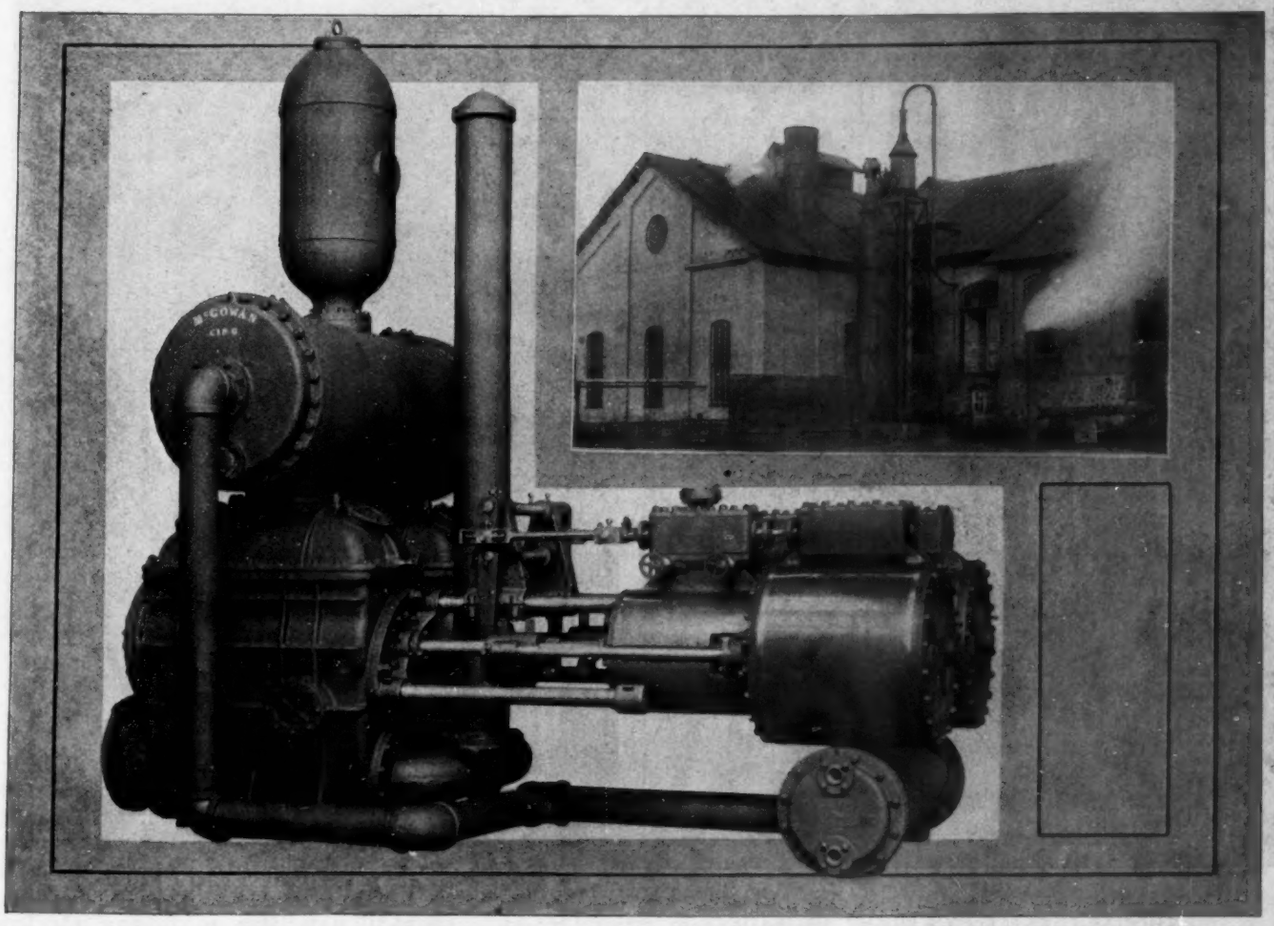


FIG. 1—McGOWAN, THREE-ROD, COMPOUND DUPLEX PUMPING ENGINE ON WHICH A DISCHARGE SURFACE CONDENSER IS USED AS A DISCHARGE HEADER

FIG. 2—TOMLINSON CONDENSER AT STEAM TURBINE PLANT OF CLEVELAND-CLIFFS IRON CO., NEGAUNEE, MICH.

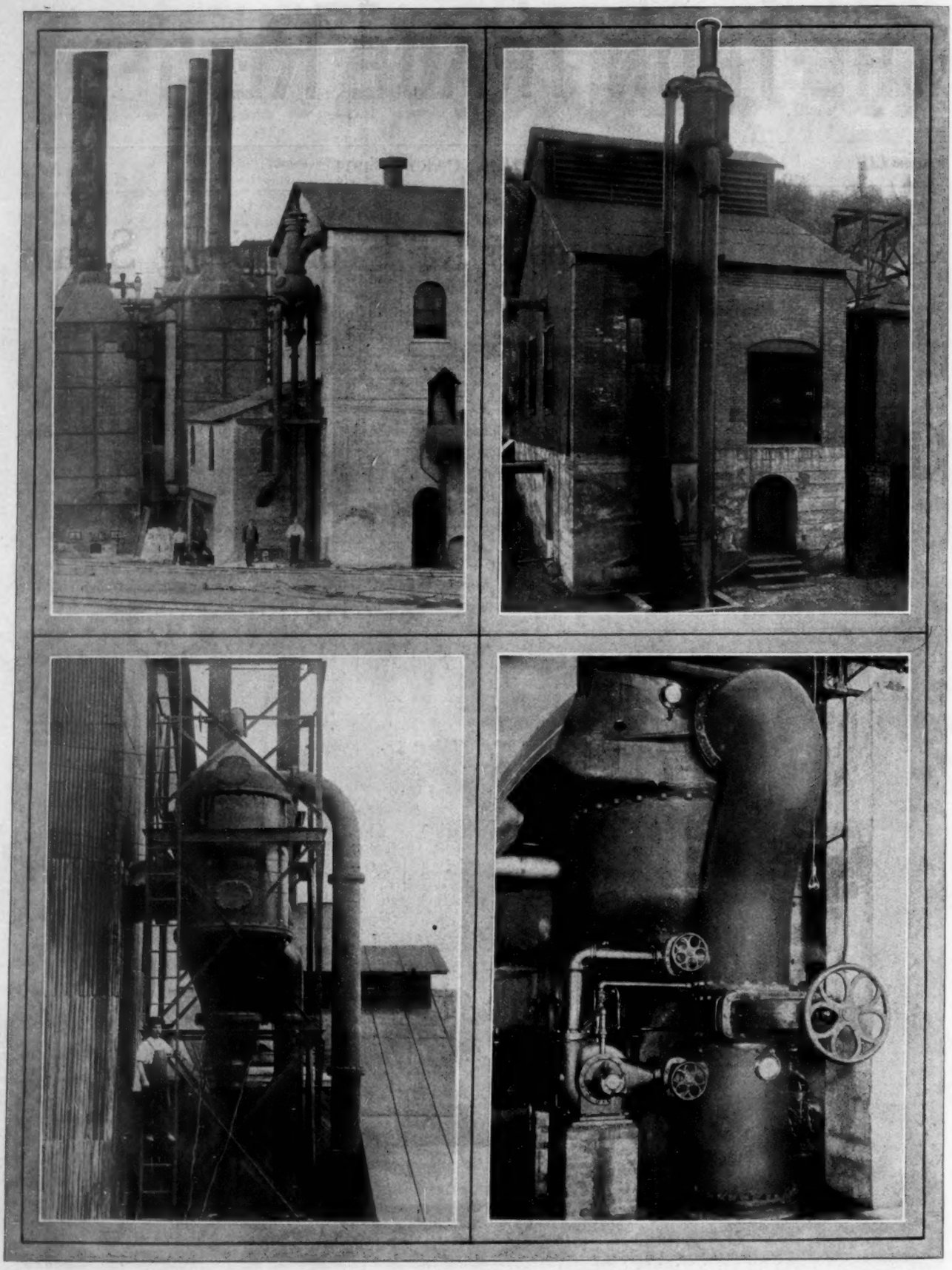


FIG. 3—TOMLINSON BAROMETRIC CONDENSER AT THOMAS FURNACE CO.'S PLANT, MILWAUKEE

FIG. 4—CONDENSER AT THE SLOSS-SHEFFIELD MINE, BIRMINGHAM, ALA.

FIG. 5—BAROMETRIC CONDENSER, EMBREE IRON CO., EMBREEVILLE, TENN.

FIG. 6—WESTINGHOUSE LE BLANC JET CONDENSER

perature of rejection, by the temperature at which the fluid is received, from which it is evident that any lowering of the temperature of rejection greatly increased the efficiency of the engine. Further, the higher the vacuum employed at the exhaust *the greater is the gain for each inch* in vacuum. Thus, while at 20-inch vacuum an increase of vacuum to 21 inches adds only 3 per cent efficiency, the higher efficiency resulting in increasing the vacuum from 28 to 29 is at least 10 per cent and may be as much as 15 per cent or more. A glance at a steam table will at once explain this; for, while the drop in temperature of saturated steam from 20 to 21 inches vacuum is only 5 degrees Fahr., the drop from 28 to 29 inches is 22 degrees Fahr.; from another point of view, the pressure multiplied by the increase in volume of a pound of steam from 20 to 21 inches is 286 foot-pounds, while from 28 to 29 inches it is 1,137 foot-pounds. Throughout this article, unless otherwise stated, reference is made to a 30-inch barometer.

Certain types of prime movers are capable of utilizing low back pressure more than others. We can divide all heat engines working with steam into reciprocating engines and steam turbines. Reciprocating engines can in turn be divided according to the speed, the number and type of valves, and the number of cylinders. The economy to be derived from running any of these various engines condensing will, in general, depend on the steam saving in each case, the value of steam and the cost of vacuum.

The simplest type of slide valve engine, subject to great losses due to wire drawing in the valve, large clearance spaces and considerable cylinder condensation, usually consumes from 30 to 50 pounds of steam per brake-horsepower when running non-condensing, depending upon the type of the governor and the load. Even this engine, ill-adapted as it is to derive benefits from reduced back pressure, shows considerable improvement from maintenance of vacuum.

The single expansion, slow-speed, four-valve engine is more efficient. The compound power, compressor or hoist engine with Corliss valves is of more general importance. The economy of using condensers with this type is much greater than with simple engines. This arises from the fact that the exhaust valves open more widely, that there is a less range of temperature and hence less condensation in each cylinder, and also because the ratio of expansion can be made greater. The steam per horsepower-hour decreases with the increasing size of the engine. Likewise, the economy derived from condensing apparatus increases as the engine size increases.

Turning now to the steam turbine, we find that this type of heat engine, owing to the greater ratio of expansion and the fact that there is no alternate heating and cooling of metal surface to cause condensation within the turbine, derives the greater benefit from condensing apparatus. In the turbine, the steam is allowed to expand completely to condenser pressure while doing work. The increase in economy of a standard 300-kilowatt turbine with increase in vacuum amounts to 40 per cent, corresponding to a reduction in steam consumption from 34.1 pounds to less than 21 pounds per kilowatt-hour, on a very conservative rating.

The lessened consumption due to operating under reduced back pressure is not the only important advantage to be derived from running condensing. Beside the saving in steam, which represents a *coal saving*, there is the *increase in the capacity of the plant* to be considered.

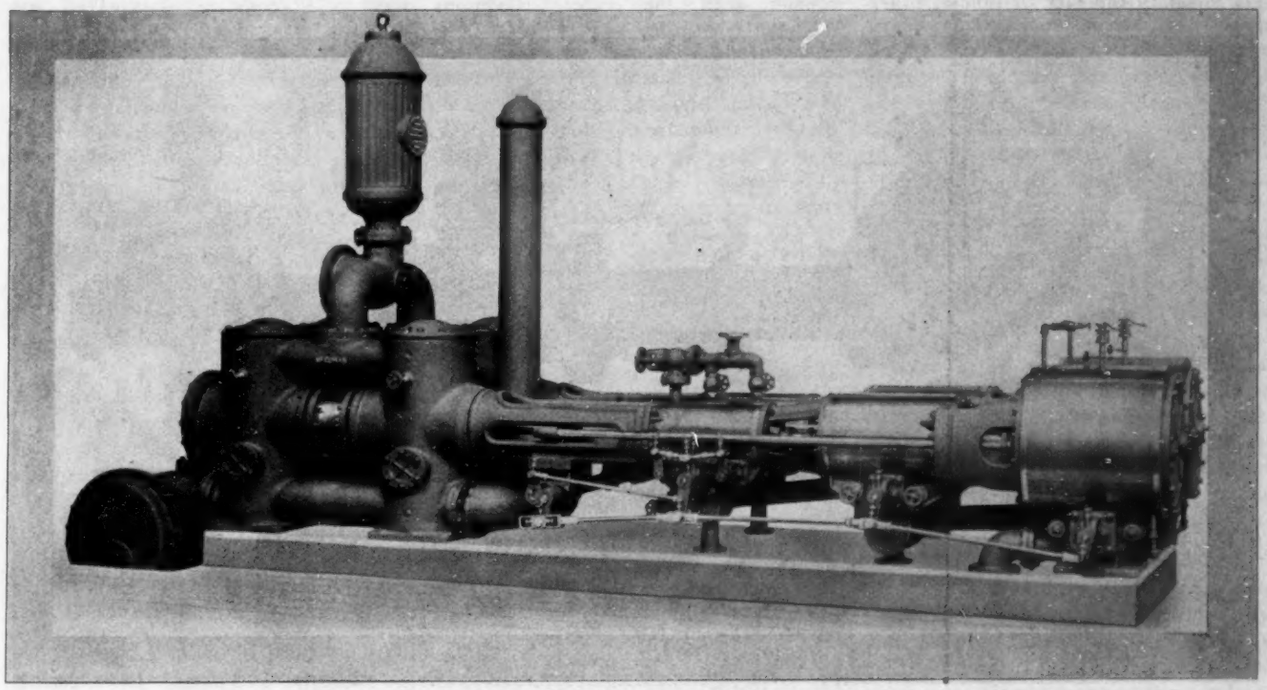


FIG. 7—McGOWAN HORIZONTAL, DIRECT-ACTING, TRIPLE EXPANSION PUMPING ENGINE WITH SURFACE CONDENSER ATTACHED

With the steam boiler equipment more power per pound of steam can be obtained when running condensing than when running non-condensing. Let us assume, for instance, that a given equipment of boilers, engines, buildings etc., cost $100 per horsepower, and the size of the plant is 500 horsepower. By installing a condenser, the capacity of the plant could be readily increased to 625 horsepower, reducing the cost per horsepower, excluding for the present the cost of the condenser to $\frac{500 \times 100}{625} = \$80$. Thus, there would be warranted an expenditure of about $20 per horsepower for the condensers. This is many times the

cost of a highly efficient condenser. The condensation of steam can, for our present purpose, be considered as a very simple process. A pound of steam at a pressure of 1½ pounds absolute, corresponding practically to 3 inches of mercury or 27 inches vacuum referred to a 30-inch barometer, will occupy, as may be found in standard steam tables, a volume of 231.8 cubic feet and will have a temperature of 115 degrees Fahr. If the steam is saturated, that is, in contact with the water, the temperature will remain the same as long as the pressure remains unchanged.

If this steam pressure is maintained within a condenser that is receiving steam constantly from an engine or turbine, a volume and weight of steam must be condensed during each minute equal to the rate of inflow; otherwise the pressure and temperature of the steam within the condenser will be raised by compression. To condense one pound of steam at the pressure and temperature given requires the abstraction of 1,027 B. T. U., the latent heat of the steam under these conditions.

Temperatures

As a pound of water will absorb one thermal unit when its temperature is raised 1 degree Fahr., 51.35 pounds of water raised through a range of 20 degrees Fahr. of temperature, therefore, will be required for each pound of steam condensed. Similarly, 34.2 pounds raised 30 degrees Fahr., 25.7 pounds raised 40 degrees Fahr., or 20.5 pounds raised 50 degrees Fahr., using approximate figures, may be used to perform the same duty. The temperature at which cooling or circulating water is received *is usually fixed* by the conditions and surroundings of the power plant. The temperature to which the water can be raised is limited by the temperature of the steam, and a perfect condenser would heat the circulating water to this temperature, and would require the theoretically minimum amount. Practically, however, there must be some difference in temperature between the steam and the water in order that the heat may flow from the steam to the water, as through the metal tubes of a surface condenser. In a jet condenser, where the steam comes into immediate actual contact with the water, conditions are different; and, if thorough intermixture is secured, the temperature of the water may be brought close to that of the steam.

Under the simple conditions stated, and assuming a perfect condenser, the vacuum is determined solely by the temperature and quantity of cooling water available. That is, if the quantity of cooling water is so limited that it must be heated to 120 degrees Fahr. in order to absorb all the heat of the steam, the best possible vacuum would be 26.50 inches. If there is sufficient cooling water to absorb all the heat with a rise of temperature to 110 degrees Fahr., the best obtainable vacuum would be 27.41 inches; similarly, for 100 degrees, 28.07 inches, and for 90 degrees, 28.85 inches; for 80 degrees, 28.97 inches; for 70 degrees, 29.26 inches, and for 60 degrees, 29.48 inches, all referred to a 30-inch barometer. A condenser based on these facts would consist, then, only of means of circulating the cooling water, of bringing the steam and water together and of removing the water resulting from the condensation of the steam.

In practice, however, the problem is much complicated by the entrance of another element, namely, air, and it is the influence of air in the condenser that proves a stumbling block to many who attempt to understand the workings of the apparatus.

The important fact to be kept in mind is Dalton's "law of mixed vapors", which may be stated in this way: "A constant weight of gas maintained at a constant temperature confined in a vessel of constant volume exerts the same pressure upon the walls of that vessel regardless and independently of any other gas or vapor present or introduced into the vessel."

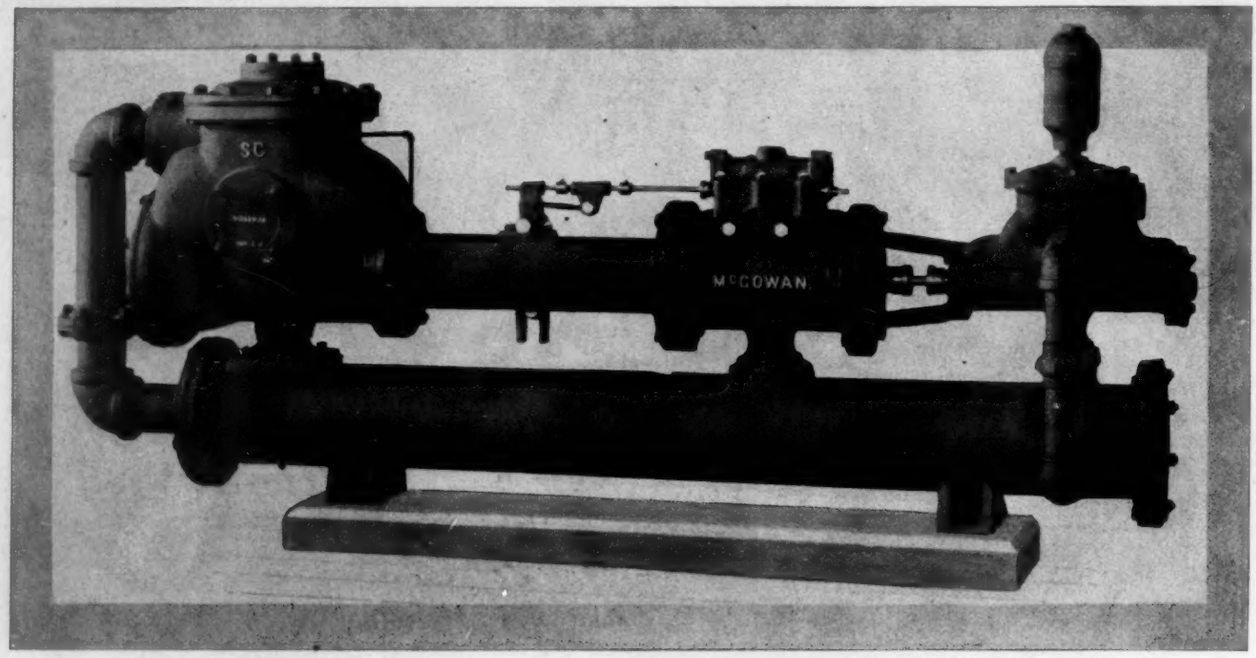


FIG. 8—McGOWAN THREE-CYLINDER PUMP MOUNTED UPON A WATER LEG, THE LARGER CYLINDER RECEIVING CONDENSATION FROM A SURFACE CONDENSER

Dalton's Law

Air and water vapor in a condenser obey this law of mixed gases. That is, if the temperature of the condenser is 101.5 degrees Fahr., the pressure due to the water vapor in that condenser is exactly 1 pound per square inch. The total in the condenser may be something quite different, as 1½ pounds per square inch,

(*Continued on page 42a.*)

Handsome Profits of British Iron and Steel Makers

During an Eventful Year—Squeeze of Last June Was Serious—Futile Attempt to Abolish Warrants—Wages Maintained—Sharpened Appetite for American Business

By J Horton

The year 1913 has been an eventful year, but in many respects less satisfactory than its predecessor, and in several directions it has presented some striking contrasts. A feature of the past few years has been the extreme activity of the autumn. In many instances merchants and others curtailed their holidays to attend to the imperative demands of business; but the closing months of 1913 were the worst of the year, and the opening of December finds many pig iron dealers without a contract worth the name, and blowing their furnaces purely for hand-to-mouth and almost day-to-day requirements. Every item of production has sustained substantial price reductions, and some of these have been of a most sweeping character, while our largest combinations have had the greatest difficulty in maintaining the loyalty of their members and one of them, the Scotch Steelmakers' Association, has failed to weather the storm.

It would be a mistake to describe it as a bad year. The handsome returns made by leading iron and steel companies are very substantial evidence pointing to a different conclusion. It has, in fact, been a year of very large output. Even now pessimism is not getting all its own way, and there are not wanting prophets who promise a substantial recovery before 1914 is many weeks old. There is still great activity in shipbuilding, and a great deal of work is known to be pending, whenever prices show sufficient steadiness to encourage forward buying. Experienced makers declare that the backward swing has been so violent that a reaction must soon ensue in the other direction.

Pig Iron Suffers Severely

The most serious fluctuations have been in the pig iron department. A year ago Cleveland prices had reached the phenomenal figure of 68s 6d on "three months" transactions; the present quotation (Dec. 3) on such sales is 49s 6d, a fall of about £1, and, at present, there are no signs that the minimum has been touched, while scarcely anybody wants to buy three months forward. As this figure is nearly a shilling higher than current prices, it is apparent from this contango that hope is not wholly abandoned. The decline has continued for the most part throughout the year, but the most abnormal conditions arrived during what was known as the "squeeze" in June last, one effect of which was the collapse of a very large firm of merchants, Messrs. James Watson & Sons, of Middlesbrough. At that time, there was a difference of at least 10 shillings a ton between current and forward quotations, but that difference was swept away at a stroke, to the satisfaction of everybody except the few speculators who lost money on the gamble. It is remarkable that the collapse in the spring of the year was foreseen by hardly anybody, and speculators were therefore taken by surprise.

One effect of that "squeeze" was a determined effort by leading smelters of Cleveland to abolish the warrant store, and adopt some method of controlling outputs and sales, and so eliminate the temptation to outsiders to disorganize the trade by gambling speculations. The effort, however, came to nought and the stores still remain. These stores, by the way, furnish one of the anomalies of the present situation, inasmuch as throughout the year, with scarcely a week's interruption, the amount in store has steadily decreased. The Cleveland stocks now amount to about 145,000 tons, as compared with 240,000 at the beginning of last year. A fall in prices coincidently with the steady diminution of stocks, is a puzzle which seems to need some explanation, especially as this absence of stocks applies generally throughout the kingdom. It is, however, partly due to the fact that the smelters have set their faces steadfastly against unprofitable production, and a large number of blast furnaces have been blown out in every part of the kingdom. In the Middlesbrough district there are now 79 furnaces in blast as compared with 91 at the beginning of the year.

Hematite iron has, of course, shared in these sweeping reductions, and whereas, at the beginning of the year, East Coast mixed numbers were selling at 82s, they can now be bought at about 60s. There is every probability that the collapse would have been much more severe, but for the high price of fuel which has resisted fluctuations in the iron and steel business in a manner quite unprecedented. Smelters are paying four or five shillings more per ton for their fuel than in some former periods of low iron prices. The explanation is the determined combinations of miners who insist on high wages, the great costs imposed by legislation equally in pit management and the imposition of taxes, and the fact that the workmen by their refusal to put in so much time in the present period of high wages are very effectually restricting output. Thus it has happened that the pig maker has felt the full brunt of the bear movement, being quite unable to pass it on to those from whom he buys either material or labor. The pig maker is unfortunate also in that he is apparently unable to obtain for himself the slightest benefit from any kind of combination or mutual understanding, and it is an undoubted fact that reductions in pig iron have been out of all proportion to those in any description of finished material.

Wages High

The periodical returns published by the Midland Iron and Steel Wages Board show that the reaction operated very slowly upon selling prices. The first return published was in January, covering the months of November and December, 1912, which showed an increase, during the two months, in the average net price obtained by the 17 selected Black Country firms, from £7 17s 7d to £8 1s 1d. During January and February, this increased to £8 4s 7d, and during March and April, to £8 8s 9d. That was the high water mark, and during May and June there was a reduction to £8 7s 11d. The downward movement continued during July and August, bringing the average to £8 3s. The return for September and October, published early in December, showed an average selling price of £7 16s 1d.

These returns involved some alterations in wages. During April and

May, there was an advance of 2½ per cent on mill and forge wages, and of 3d in puddlers' wages. In June and July there was a further advance of 2½ per cent and 3d, respectively, a rate which was continued during August and September. There was a reduction during October and November of 2½ per cent in millmen's wages and 3d in puddlers' wages, and a further reduction for two months commencing Dec. 8, of 6 per cent for puddlers and 5 per cent in other mill and forge wages.

For the Northern Board of Conciliation and Arbitration, selling prices were as follows: For November and December, 1912, £7 1s 9d; January and February, 1913, £7 7s 3d; March and April, £7 10s 2d; May and June, £7 11s 3d; July and August, £7 12s 7d; September and October, £7 6s 7d. Wages were unchanged in the North of England during February and March; there was an advance of 2½ per cent on forge and mill wages during April and May, with 3d on puddlers' wages; a further advance during June and July of 2½ per cent and 3d, which continued during August and September, and a further advance of 2½ per cent and 3d during October and November.

These figures with regard to wages serve as a reminder of the exceptional difficulties now pressing upon iron masters, as with rapidly reducing prices they are still paying wages not far below the maximum, and probably some of them have already made inroads into the substantial profits earned during the previous year, in meeting this heavy cost of production. They, of course, had the advantage of the steadily enlarging profits during the period of rising prices, when wages for some time continued on the lower basis; but the firms less favorably situated are likely to endure a severe strain during the next few months.

The statistics of output, while they show a decided falling off, still indicate a fairly substantial production during the whole period. Taking the Midland district, the bi-monthly amounts of the 17 selected firms covering bars, angles and tees, plates and sheets, hoops, strip and miscellaneous, were as follows: 44,408 tons, 40,146 tons, 39,425 tons, 32,464 tons, 29,917 tons, and 29,363 tons.

The effect of the depression has been concentrated more severely on some departments than on others. The makers of gas strip have suffered most, through the extensive strike in the Midland district during the summer months initiated by the Workers' Union, to secure a rise of 5s per week in the wages of unskilled laborers. The largest firms involved in that strike were makers of gas and steam tubes, and the builders of railway rolling stock. A number of tube works were stopped completely for eight weeks, and the wagon works fared almost as badly. While the latter have recovered, and are now taking their normal quantities of iron, the tube makers are nearly stagnant, and have, undoubtedly, permanently lost a large quantity of trade, which, during the strike, was captured by their keenest competitors, the German tube manufacturers.

Galvanized Sheets

The galvanized sheet trade apparently occupies a position by itself. It is very significant that all other classes of finished iron show decreased exports almost throughout the year. But galvanized sheets have steadily defied depression, in persistently showing increases alike in tonnages and value. During the ten months ending October, the shipping exports reached a total value of £8,407,123, as compared with £6,899,595 for the same period in 1912. This great increase in value was attained in spite of a steady fall in the price per ton. In January last, the selling price for galvanized sheets f. o. b. was £12. A great many have been sold recently as low as £10 10s. It should be added also that galvanized sheet makers have had to sacrifice important South American markets, in competition with America, and they anticipate still keener competition in those markets following the substantial reductions in American tariffs. The productive capacity of British sheet makers has been hugely increased during the year, and the process is still going on. But during the past six months the few remaining mills in South Staffordshire have had a very hard time and look forward to the alternative, at no distant date, of the transfer of the whole of this trade to works on the coast. Fortunately for them, Birmingham is a rather useful exporting center, and also a fairly good distributor of sheets for home requirements, and this insures a certain amount of business for the local mills. The sweeping reductions in price show that the makers are determined to make a keen fight for their share of the world's business.

Tin Plate Depression

Probably, the most unfortunate department of the British iron and steel trade is that of tin plate, in which a large proportion of the mills have had an alarming amount of idleness during the year, while there has also been a great shrinkage of prices. In January oil sizes were being quoted 15s 6d for boxes of 110 pounds. By the end of the year, this had been reduced to 13s. The export returns still show fairly large aggregate values, and the troubles of the trade have been largely due to the enormous additions to the number of mills during the boom, when it will be remembered that something like 120 were added to the existing plants. It is now clear that the owners of these were unjustifiably optimistic, and they had the further ill luck to commence operations just before the Balkan war, which, for the time being, practically killed the Eastern trade. They have also lost a great amount of business to the competition of America, and while they are not without hope of increasing their supplies to the United States now that tariffs have been reduced, they are also fully alive to the prospects of keener competition in the open market.

The dullness in tin plate which, by the way, has not yet responded to the termination of the Balkan war, has developed some little controversy in the way of explanation of the depression and various suggestions for dealing with it. One development was a meeting of manufacturers at Swansea in July, with a view to bringing pressure to bear upon the Canadian authorities to put what is known as the "dumping clause" of the Canadian tariff law into operation, with a view to the prevention of the dumping by America into Canada of her excess products. Apparently, although the agitators were favorably received by British ministers, nothing practical has resulted. It was definitely stated at that time by F. W. Gilbertson, the president of the Swansea Metal Exchange, that the action of the United States in selling its products to Canada at a loss was the cause of 33 mills in South Wales remaining idle. Another novel effect of the depression was a movement among the Welsh trade unionists to order a general stoppage of the mills for a week or a fortnight, with the object of hardening prices through the cessation of output; but this effort, like the other, proved abortive. Apparently there is no sort of organization in South Wales that is able in any way to control either output or prices. The only relief the Welsh tin plate maker has obtained is in the reduction of sheet bars, to which the very large Continental importations by way

of Newport have very materially contributed.

A great deal of interest has been taken by the hoop trade in recent tariff changes in America. The Birmingham district and also certain large mills in Lancashire are especially interested in the abolition of tariffs upon cotton ties. Enormous quantities were formerly sent out from both districts, and 20 years ago the abolition would probably have had a great and immediate effect upon business. But South Staffordshire iron masters now do not anticipate any revival of that industry, unless the trade conditions and the relation of British and American prices change very materially from what they are at present. For some years, the cotton-tie trade of Great Britain, at all events as far as America is concerned, has been practically extinct.

Finished Iron

Of finished iron, generally, it may be said that while prices have fallen, they have been held better than most people expected. Marked bars are now £9 in Birmingham, and unmarked £7, representing a fall of £1 in marked bars, and £1 12s 6d in unmarked. Other descriptions are fairly proportionate in the amount of reduction. Although, for months past, the business in the Staffordshire mills has been of a hand-to-mouth character, the total volume has been very fairly maintained.

The Steel Trade

With regard to the steel trade, experience has been rather varied, but in regard to foreign competition the position has completely changed during the year. The British boom was largely due to the fact that imports of foreign material for months together were so small as to be negligible. Great Britain had in fact for the time being recovered the command of her own markets. The position has greatly altered, as the latest Board of Trade returns indicate. During the ten months, there was an increase in iron and steel imports to the value of £2,068,367. It was only during the closing months that the effect of this was severely felt. For a long time, steel makers disregarded foreign competition, for the sufficient reason that they had comfortable reserves of unexecuted orders remaining from the boom period. When these became exhausted in August, a series of sweeping reductions followed, the price of angles, tees, channels, etc., being brought down 35s in England and £2 in Scotland by a series of three reductions of 10s each, and one of 5s. The effect was more severely felt in Scotland, where enormous quantities of ship plates have been dumped from Belgium and Germany. The Scottish makers were swept nearly off their feet. The Clyde was the most attractive market for the foreigners, for the excellent reason that shipbuilding remained throughout the year the steadiest and most prosperous business. Right up to September, record figures were made in the outputs from the Clyde and North of England shipyards. The buoyancy of the shipbuilding trade is shown by a recent decision of the Belfast Harbor Board to erect new wharves and jetties in the Musgrave channel. At the present time, Messrs. Harland & Wolfe are carrying through enormous extensions of their works at Belfast to enable them to grapple with business sufficient to keep them occupied for some years to come. In the extremity of the Continental steel makers the Clyde was the natural objective for their dumping operations. The effect has been that certain Scotch steel-making firms threw over the syndicate, withdrew the 5s rebate to British buyers, which had continued for the past two years, and entered unreservedly into the fierce competition for orders. Within the past few days all the Scotch makers have followed this example and no serious attempt seems to have been made below the Tweed to check this policy.

The sweeping reduction in plates has greatly reduced the cost of new ships and is quite likely to further prolong the great shipbuilding output. The four reductions below the Tweed, three of 10s and one of 5s, have brought additional orders, and the steelmakers hope to get through without any futher interference with prices. But this, of course, can only be effected in the event of the much-desired revival coming fairly early in the New Year. British makers have had to pull down their prices of half-finished steel. Billets began the year at about £6, and are now to be bought at £4 12s 6d. The recent reductions came too late to prevent the capture by the Belgian syndicate of many thousands of tons of orders from Midland finishing mills and Welsh sheet and tinplate makers. Thanks to the large consumption of joists for building extensions, the makers of these did not find it necessary to follow the reduction in other descriptions of steel. It is quite likely that northern steel will be further reduced, as German plates are being offered at about £5 per ton, as compared with £6 10s on the Clyde and the North of England. These plates, it is said, are quite up to Lloyd's shipbuilding requirements, and are accepted without hesitation by the builders.

Sheffield District

The Sheffield district has probably fared better than any other steel-making district, chiefly on account of its varied production, and its important share in the manufacture of shipbuilding steel, heavy forgings and battleships. As a matter of fact, great extensions of plant are at the present time in progress at several of the largest works. These are partly due to the shortage of labor in the early part of the year, which led the manufacturers to greatly increase the share of machinery in the general production. The race of armaments among European nations, which, in spite of almost universal protest, goes on practically without interruption, brings large orders to Sheffield, and the great armament works and shell manufacturers probably have at least two years' work in hand. The railway steel business is, for the time being, dull, but there are known to be heavy contracts pending, in respect of home and colonial extensions, while the spread of tramways in the great English cities has almost created a new department in the steel trade.

The wiremakers generally have had a very good year, but they find increasing severity of competition from Germany, British prices being cut in some cases from 15s to 20s per ton.

Prospects Hopeful

With regard to the steel trade generally, the prospects are rather hopeful. It is well known that the British railways are practically without rolling stock reserves, and must immediately place orders on the arrival of the least spurt of new business, while India's requirements in respect of programs already arranged must be very heavy for some time to come. Every month brings increasing demands for high-class steel for motor cars of all sorts, aviation and many other special requirements. Stocks also everywhere are low, while iron warehouses are approaching the danger point with regard to supplies. The new uses of steel, especially in buildings, are full of promise for the trade. Hundreds of picture houses have been erected during the year, every one of which has made demands on the steel trade for the sup-

(*Continued on page 42a.*)

Automatic Controller for Alternating Current Machines

In using alternating current for motor-driven machinery, some difficulty is experienced where a comparatively large range of speed variation is required. When direct current is used, speed variation is readily obtainable by slowing-down the motor or by speeding it up above normal speed. With alternating current, however, all regulation must be made by slowing-down the rotor below normal speed and where slow-running speed is desired, the motor has not sufficient torque to satisfactorily start the load. In some plants it is still the practice to use hand controllers for operating alternating current motors and with this type of controller it is necessary to move the regulating handle to a

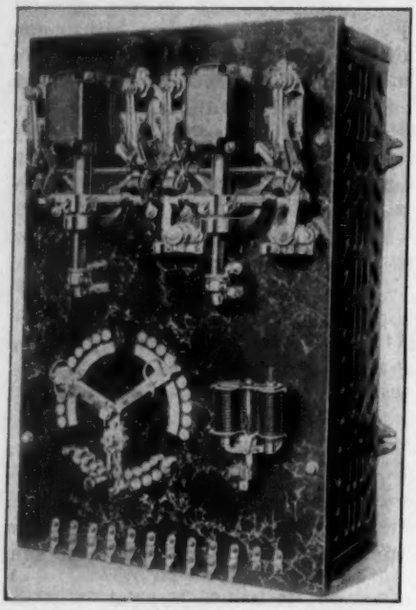


FIG. 1—ALTERNATING CURRENT, AUTOMATIC CONTROLLER

point approximating the normal speed of the motor, and when the rotor starts to revolve, the handle must be moved back quickly to the low speed at which it is desired to operate the machine.

The Monitor Controller Co., Baltimore, recently has perfected a controller for either single, two or three-phase alternating current motors, paralleling in practically all respects this company's pre-set speed types of direct current equipment. With alternating current work, the dynamic brake for stopping cannot be furnished and, therefore, it is necessary to use the foot brake provided with various machines or to use a magnetic brake, which can be furnished with any standard motor. This magnetic brake is operated from the alternating current controller. The accessories employed with this type of controller are identical to those used with corresponding types of direct current apparatus built by this company. Starting, stopping, reversing and slight movements of the machine can be effected automatically and every movement controlled from a station either by push button or by a safety lever. The station is shown in Fig. 2.

The distinctive feature of this controller is that in starting, a proper amount of resistance is inserted automatically in each phase of the motor which insures correct starting characteristics and is the same under all operating conditions. After the rotor has attained the proper speed, a starting resistance is cut-out automatically by the controller and the regulating resistance, which has been determined previously by setting the handle, is thrown-in automatically, bringing the motor promptly to the speed desired, which may be at any point between normal and the lowest speed specified. A no-voltage release is provided so that in the event of failure of the line voltage and the consequent stoppage of the motor, the entire system is cut-out automatically and will not again start on the return of the voltage until the operator again has touched the starting button or lever. All circuits are made and broken between graphite and copper and all contacts carrying considerable current are reinforced by laminated, copper-carrying contacts. These alternating controllers are built for single or two-motor drive, depending upon the amount of speed variation desired and are furnished for motors whose rotor current does not exceed 150 amperes.

Diesel Engine Fuels

The growing use of Diesel oil engines in this country has awakened interest in the question of fuel supply for this type of motor. The stringency in the fuel oil market for the past year is a matter of common knowledge, although the additional production in the southwestern fields induced by the high prices prevailing at the close of 1912 has considerably relieved the situation for the time being.

Owing to the fact that Diesel engines can use almost any grade of crude petroleum or fuel oil, their situation is more advantageous than that surrounding other types of internal combustion motors. The total production of crude petroleum in the United States has increased from 2,000 barrels to over 220,000,000 barrels per year in less than half a century. Less than 2 per cent of this large production is now consumed in Diesel engines, although there is an aggregate of about 70,000 horsepower in operation in this country. A great deal of the crude oil now being produced contains little or no gasoline, but this does not militate against its use as a fuel for Diesel engines. The price of these lower grade crudes is held down by the competition of cheap coal and hydro-electric plants.

Tar oil which is produced by the distillation of coal tar is used extensively in European countries as a fuel for Diesel engines. Germany, which leads the world in the number of Diesel engine installations, produces little or no crude petroleum. Furthermore, the German government levies an import tax against petroleum and its heavier derivatives. It has been estimated that between 30 and 40 per cent of the total horse-

FIG. 2—SAFETY LEVER STATION FOR ALTERNATING CURRENT CONTROLLER

power of Diesel engines in Germany are now operated on tar oil.

There are no producing nickel mines in the United States. The output of nickel from domestic ores is merely a by-product from electrolytes of the copper refineries. Salts and metal equivalent to 328 short tons of metallic nickel were saved in domestic refineries in 1912 from both foreign and domestic ores. Nickel ore "imported for consumption", is mostly from the Canadian deposits.

The Toronto, Can., branch of the Canadian H. W. Johns-Manville Co., Ltd., has been removed to more commodious quarters at No. 19 Front street, east. The store and warehouse has a floor area of approximately 35,000 square feet.

Industrial Cars for Manufacturing Plants

For handling material in industrial plants served by narrow gage tracks many different types of cars are employed. The Orenstein-Arthur Koppel Co., Koppel, Pa., is building an extensive line of cars for this service, several of which are shown in the accompanying illustrations. The cost of power house operations can be reduced materially by providing means for handling ashes directly from the ash pits without being compelled to rake them out and shovel them into cars or wheelbarrows. In Fig. 1 is shown the type of steel car into which the ashes fall directly from the grate into the steel box of the car. When the car is full, it is pulled out and run outside of the boiler house to the ash dump or it is lifted by a crane and the ashes are dumped into a standard gage car for removal. The

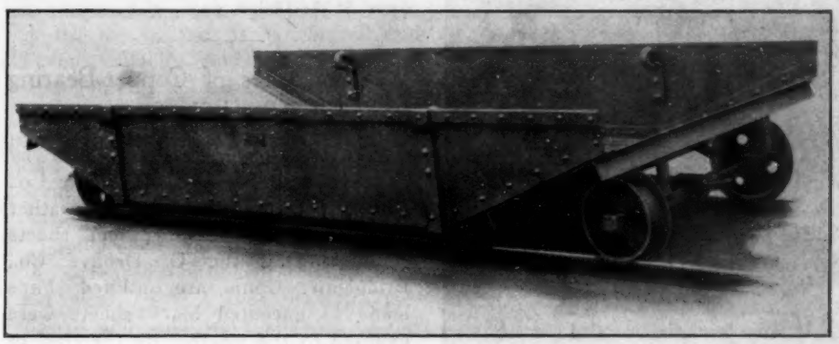


FIG. 1—SPECIAL, STEEL ASH PIT TRUCK

body of this car is made of 3/16-inch steel plate, heavily reinforced, to prevent warping by the high temperatures to which it is subjected. The wheels are made of cast steel. The car is exceptionally low, having a height of only 24 inches and the gage is 36 inches. It is 12 feet long, 5 feet 5½ inches wide and has a capacity of approximately 95 cubic feet.

As a rule, the curves of industrial railway tracks are of small radius and when the material to be hauled consists of long pieces, such as steel bars, structural material, etc., it is necessary to use a correspondingly long car and to mount the car on double trucks to permit its passage over small radii curves. Even when mounted on double trucks the overhang of the front end of the car frequently is such that it is necessary in some cases to provide radial draw bars so that the cars can remain coupled while passing over curve. To eliminate the necessity of using radial draw bars the Koppel company has designed a car, as shown in Fig. 2, on which the trucks are built to extend beyond the ends of the platforms, thereby permitting the coupling to be fastened directly to the truck frame instead of to the body.

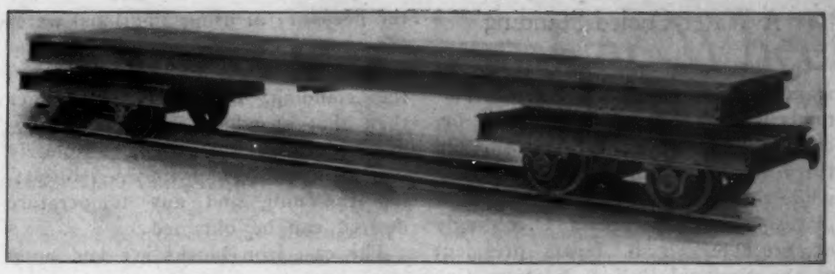


FIG. 2—SPECIAL CAR FOR TRANSPORTING MATERIAL IN LONG LENGTHS

In solving the transportation problem of a large nut and bolt company, trucks were required which could be operated at any point on the factory floor, and which also could be employed for carrying material long distances between the various buildings of the plant. At the same time it was desired to avoid the heavy power required for operating the ordinary type of flat wheel truck. This problem was solved by designing a truck, as shown in Fig. 3, and it will be noted that it is provided with two large center wheels with flat tread and one wheel at each end, mounted on a caster placed at a greater height from the floor than the center wheels. When being pushed over the floor, this truck is similar to an ordinary caster wheel truck, but it will be noted that the caster wheels are flanged to fit over the head of a rail. A single rail has been laid in this plant to facilitate the operation of trucks of this type, and it is claimed that one man can readily push this truck, it being guided by the rail and the two caster wheels.

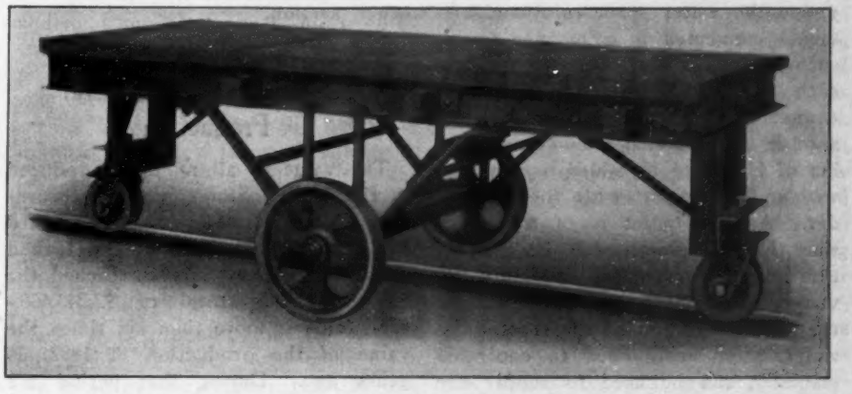


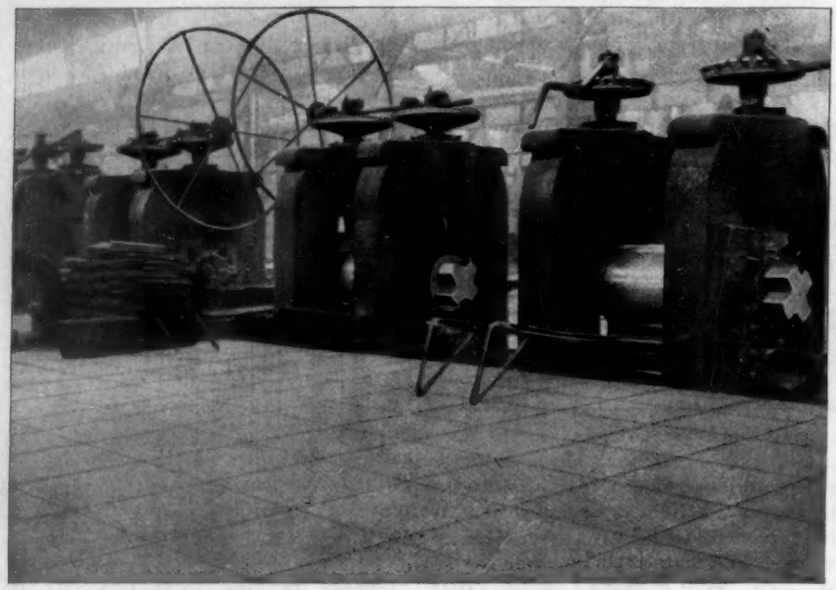
FIG. 3—SPECIAL TYPE OF CAR PROVIDED WITH TWO CASTER WHEELS, WHICH OPERATE ON A SINGLE TRACK

Will Electrify Pennsylvania Railroad for 20 Miles

Work on the electrification of the Pennsylvania railroad's line between Philadelphia and Paoli, which has been under consideration for a long time, will be commenced some time before spring. The overhead trolley system, it is understood, will be employed and the cost of converting the road, which is about 20 miles in length, from steam to electricity, will be in the neighborhood of $4,000,000. A contract has been placed by the railroad with the Philadelphia Electric Co., by which the latter will supply current for the operation of electric cars during the next five years. The contract calls for a minimum of 3,750 kilowatts and the railroad has the right to draw on the electric company for such additional power as may be necessary from time to time. It also is probable that the Pennsylvania railroad will electrify its branches running from this city to Chestnut Hill and other nearby towns. A portion of the required rolling stock already is at hand, as, for nearly a year, new cars for the Paoli and other lines have been provided with motors and the other electric equipment needed.

A Water-Cooled Standing

In sheet and tin plate mills the standing in the front of the rolls, particularly in the summer months, become unusually hot and as a result the feet of the workmen are affected, while the reflected heat from the floor plates makes operations exceedingly disagreeable. J. B. Baird, president of the National Roll & Foundry Co., Avonmore, Pa., with offices at Pittsburgh, has designed a water-cooled standing for sheet and tin mills in which all of the desirable features of existing standings are retained and temperature control is introduced in a manner that requires no change in the lay-out of sheet and tin mills. A water-cooled standing, as installed at one of the sheet mills of the Follansbee Bros. Co., Follansbee, W. Va., is shown in the accompanying illustration.



WATER-COOLED STANDING INSTALLED AT THE PLANT OF THE FOLLANSBEE BROS. CO., FOLLANSBEE, W. VA.

Each square of the standing consists of a hollow cast iron box, 2 feet square with a series of ribs which divide the water space into compartments connected in a manner to insure the circulation of water through each compartment. Each block is connected to the adjoining block by a push nipple which allows any number of blocks to be added or removed without interfering with the remainder. As the outlet is of a smaller size than the inlet and the connection nipples, the full pressure of water is retained in every block in the standing, and, therefore, the water, after being used to cool this standing, can be used to supply the boshes at the furnace or for cooling the water shields. This eliminates the necessity of using additional water for cooling the blocks. The temperature of the water, as it emerges from the standing, of course, is higher than that at which it enters. However, the temperature is absolutely under the control of the men operating the mill, and any temperature desired can be obtained.

The cast iron blocks are laid upon a concrete base, thereby insuring stability and an even floor. While no leakage of the water from the connections between the various blocks has occurred in the Follansbee plant after six months' trial, nevertheless provisions are made in the concrete base to drain off any possible leakage into the mill pit. The blocks are held together rigidly by transverse bolts extending across, but underneath the standing, so that no separation or sagging of the blocks is possible, and if by some unusual accident any block should be broken, the section of which it is a part can have its water supply cut off without interfering with any other section.

Record-Breaking Mineral Production

The value of all minerals produced in the United States in 1912, according to figures compiled by Edward W. Parker, statistician of the United States Geological Survey, reached the record-breaking total of $2,243,630,326. This is more than six times the value of the production in 1882, 30 years ago. During that period the population has not quite doubled, but the per capita output of the mines has increased from $7.27 to $23.47.

During these three decades the value of the output of some minerals has made a striking increase. The value of the pig iron product, for instance, has increased from $106,000,000 to $420,000,000; copper, from $16,000,000 to $205,000,000; gold from $32,000,000 to $93,000,000; lead from $12,000,000 to $37,000,000; zinc from $146,000,000 to $695,000,000, while natural gas also showed a large gain.

Still more striking illustrations of the growth of the mineral industry in the United States are the figures showing that, while in 1880 the total mineral production in the United States was valued at $364,000,000, in 1912 the value of the pig iron alone was $420,000,000, while the value of the coal production for 1912 was nearly double the total mineral output of 30 years ago. In 1880 the value of the mineral products was approximately $1,000,000 a day; in 1912 it was over $6,000,000 a day.

Weather Tests of Copper-Bearing Steel Sheets

In a four-page circular issued by the American Sheet & Tin Plate Co., Pittsburgh, the results of weather tests of copper-bearing steel sheets conducted by the G. Drouve Co., Bridgeport, Conn., are outlined. Pans made of uncoated black sheets were exposed to the weather on the roof of a building on Nov. 5, 1912, and they were removed Oct. 9, 1913. The pan made from copper-bearing steel sheets, manufactured by the American Sheet & Tin Plate Co., weighed 54½ ounces when originally exposed and 36 ounces when removed on Oct. 9. The loss in weight was 18½ ounces, or 34 per cent. Other pans made from black sheets and indicated as materials *B* and *C*, and not manufactured by the American Sheet & Tin Plate Co., weighed 63 and 61 ounces, respectively, when originally exposed and 36½ and 32 ounces, respectively, when removed. The percentage of loss on these two metals was 42.3 and 47.5 per cent. The analysis of the copper-bearing steel sheets follows: Carbon, 0.13 per cent; manganese, 0.40 per cent; sulphur, 0.027 per cent; phosphorus, 0.004 per cent, and copper, 0.29 per cent. The analyses of materials *B* and *C* follow: *B*, carbon, 0.025 per cent; manganese, 0.038 per cent; sulphur, 0.03 per cent; phosphorus, 0.005 per cent, and copper, 0.17 per cent. *C*, carbon, 0.025 per cent; manganese, trace; sulphur, 0.029 per cent; phosphorus, 0.004 per cent, and copper, 0.04 per cent.

The Future of the Chilled Cast Iron Car Wheel

The Problems Confronting Wheel Founders, Induced by Higher Speeds and Increased Loads, Also Competition From the Rolled Steel Wheel

Since the introduction of the steel wheel for freight car service, considerable doubt has been expressed by prominent railroad engineers regarding the future of the chilled cast iron car wheel. The constantly increasing loads and high speeds have subjected the cast iron wheels to exceedingly severe service, and some roads today are specifying the use of steel wheels exclusively on cars carrying loads of 100,000 pounds or over. At the recent meeting of the iron and steel section of the American Institute of Mining Engineers, P. H. Griffin called attention to the fact that the conditions of wheel service have been changed so radically in the past 10 or 15 years by the use of freight cars of 40 and 50 tons capacity, that it is fair to say in the interest of all concerned in the use and in the manufacture of such wheels, that the increased strains and loads have been quite sufficient to account for much of the service results that have transpired.

That proper provision was not made for increased possibilities of strength and wear, in fact that previous factors of the kind were allowed to deteriorate, is no proof that such wheels cannot be made equal to the heavy service conditions required.

It was somewhat remarkable that a radical change occurred in the important factor of price paid for chilled wheels about two or three years before the possible use of the 50-ton car was seriously entertained. In 1893 the price for chilled wheels used for renewals and repairs, which is determined and fixed by the rules of the Master Car Builders' Association, was reduced about 25 per cent from the basis at which it had stood for the preceding 10 or 15 years; and in 1895, a further reduction of about as much more was made.

This brought the net price that any railroad could charge for wheels used for renewals and repairs, made on cars belonging to any other railroad or owner, down to about 60 cents per 100 pounds, plus the delivery of an equal weight of worn out or failed wheels. General business conditions about that time were such that severe competition existed in the purchase and sale of all material having to do with railroad equipment.

Between 1895 and 1900, the price of chilled car wheels used under new cars did not exceed an average of 1 cent per pound. This price covered the entire payment made for the wheel. It is manifest that such a change in price conditions was bound to affect in a very serious manner the quality of material used and the kind of workmanship that could be devoted to the manufacture.

In 1900 the use of freight cars of 50 tons capacity had passed the point of experiment so far as successful construction was concerned, and during the next five years the number of such cars built increased from year to year.

Increased Loads

From 1905 to the present time this increase has been more rapid from year to year, until the number of such cars amounted, as it now does, to nearly one-third of the entire total of freight cars in use. This figure is approximate and may be a little in excess of the present proportion, but the total number of cars of 40 tons capacity in use, taken together with the 50-ton cars, will undoubtedly bring the total of both classes somewhat over the half of all freight cars in service. This radical change has taken place principally since 1895, the date at which the reduction in M. C. B. price of chilled wheels was made.

It will be seen, therefore, that during a period of about 15 years the price of the chilled wheel had been at a point nearly 50 per cent below the price per pound that previously prevailed, while the load carried per wheel and the general severity of service conditions increased in about the same proportion.

Whatever the shortcomings of the chilled wheel may have been under such conditions, it is necessary to make due allowance for this fact, and whatever the possibilities of its future service may be, it is equally necessary to make provision for such change in the M. C. B. price as will admit of the use of the quality of material and manufacturing practice that will be at least equal to the quality used before the reduction in price was made.

In the discussions that have taken place, it is probable that no concise impression has ever been made upon the mind of the average railroad official as to what this necessary difference should be. Speaking from a fairly intimate knowledge of the cost of manufacture and material used during some 15 or 20 years prior to 1895, and of the same during the interval since 1895, it can be stated safely that an advance of $2 per wheel in the M. C. B. price for 33-inch, 725-pound wheels, the standard for 50-ton car service, will be sufficient to provide for the use of materials and manufacturing process, equal to any that was used in the first period referred to. And that the scrap value of such wheels, because of the better quality of material in them, will be 75 cents more than the present M. C. B. price for worn out wheels. The present M. C. B. price for wheels of diameter and weight named is $9, and the present M. C. B. scrap allowance for the worn out or failed wheel is $4.75, making the net price per new wheel $4.25; the latter being all that can be charged by any railroad, per wheel, for wheels used for renewals and repairs, and the change suggested would make the price of the new wheel $11; the price of the worn-out or failed wheel $5.50, and the net charge that could be made $5.50, for the new wheel.

The manufacture and use of the rolled steel wheel began experimentally about the time that the construction of the 50-ton capacity car commenced, and after passing through the usual experimental stages of manufacturing, plant, equipment, etc., the making of such wheels has become quite well established.

When such wheels were first made and used it was claimed that their life would be about equal to that of the steel-tired wheel, but that claim was based on the idea of turning down the tread of the rolled steel wheel, when worn, and to secure in this manner three or four periods of life instead of the single period embraced in the use of the chilled wheel. This practice was never carried out to any extent, and whether it is now or may be, in the future, will depend on whether railroads are prepared to install the necessary plant for doing such work and make it a part of their regular shop practice. Such a change, if made, will be quite a radical one compared with the more simple practice associated with putting in service and replacing chilled wheels. That such practice has not been carried

out to any considerable extent by the railroads that have made the most extensive use of the rolled steel wheel is clearly indicated by the number of such wheels sold as scrap after the first removal from service.

The rapid increase in wear at the junction of flange and tread, known as the "throat", introduces quite a different condition with respect to the turning down of treads and flanges of wheels used in heavy freight car service, because, regardless of the wear on tread, sufficient metal must be taken from both tread and flange to form a new and proper contour of both. A wheel that is worn to the M. C. B. limit of flange wear, will require the removal of at least ⅜ inch of metal from the tread section, or ¾ inch from the total diameter to restore the proper flange section. Considering the fact that the best wear is obtained from the outer section of the metal, it may be seen that there are some vital questions involved in the practice described.

One thing, however, is quite clear. The wheel used under cars of 50 tons capacity must be equal to the service demands upon it to the best of the ability of those responsible for the conditions of such service to obtain such wheels, and the question of cost or type of wheel must be secondary, in the long run, in this respect.

It is important, therefore, in considering the possibilities of the chilled wheel in 50-ton car service, to obtain all possible data as to the past performance of such wheels under service conditions of like kind.

Car Wheel Mixtures

Prior to 1895, the use of charcoal pig iron in the manufacture of chilled wheels was quite general, and up to about 1890 about 50 per cent of such metal was generally used by chilled wheel makers.

A mixture used between 1880 and 1890 by one of the large manufacturers of chilled wheels, consisted of a total of 1,800 pounds of charcoal pig iron out of a total charge of 3,400 pounds put into the cupola. This 1,800 pounds of charcoal pig iron consisted of 1,600 pounds of Lake Superior and 200 pounds of southern charcoal iron. This mixture was considered, at that time, as an ordinary character, and for chilled wheels used under locomotives and passenger cars the mixture would have consisted of a larger proportion of the more expensive charcoal irons made in small furnaces in the eastern and southern states. But it is interesting to note that even for ordinary mixtures, at that time, 50 per cent of the total quantity consisted of charcoal pig iron.

The use of those mixtures which contained coke, pig iron and scrap, hardened with steel scrap, and given a certain chilling quality by the addition of ferro-manganese, began about 1888; and as it was possible to produce chilled wheels that would give the same results under test as those made from charcoal iron mixtures, it is easy to see how and why the business fell more and more, from year to year, into the hands of wheel makers developing and carrying on such practice. There is no doubt that the reductions in price made in connection with competition to secure orders brought the price of such quality of chilled wheels down to a basis that largely accounted for the reduction made in the M. C. B. price in 1893 and 1895.

Drop and Thermal Tests

About the same time the use of the drop and thermal tests became more universal, and the application of such tests to wheels made for monthly renewal and repair orders issued by the railroads, became more general. There is no doubt that these tests were relied upon very largely by railroad officials to determine the quality of car wheels purchased, and they were valuable to that end. Such tests, however, were increased in severity from year to year, and it is now evident that about 1900 the quality of wheels made under such practice was governed more by the necessity of getting the wheels past the tests, than by the fitness of the wheels to resist the service conditions that caused more rapid wear and failure.

Up to 1900 the recasting of wheels removed from service, which had been made out of the charcoal iron mixtures, retarded the effect of the new practice so far as service results were concerned. Between the year 1900 and the present date, and as wheels have been recast into new ones, this condition has been less and less effective from year to year.

Statistics of Failed Wheels

The report of the Interstate Commerce Commission for the year terminating June 30, 1912, gives the statistics of derailments caused by broken and failed wheels. These statistics show that 2,520 derailments were due to broken and burst flanges, and 999 were due to miscellaneous wheel failures, making a total of nearly 10,000 derailments due to wheel failures out of a total number of derailments due to defective equipment, of 28,904. These statistics cover the period 1902 to 1912 inclusive, or 11 years, and show a much heavier increase in the number of derailments due to wheel failures than can be accounted for by the number of freight car wheels in use, as the same increased from year to year.

The total number of such wheels in use is about 20,000,000, and the annual capacity of the chilled car wheel makers, included in the membership of the wheel makers' association, is given in the Proceedings of the M. C. B. Association for 1909 as about 6,000,000 wheels, based on the output per day for the different makers of about 20,000 wheels.

If the annual output was fully maintained, it would mean the making of a sufficient number of wheels to renew the entire total in use in periods of less than four years each, but it is probable that the output is not always so maintained, although it must be nearly so.

The statistics referred to do not distinguish as to the type or kind of wheel that caused each derailment, and it must not be supposed that the failure could be attributed to chilled wheels in any particular proportion as compared with the steel wheels, either of the rolled or steel-tired type. Although no such complete statistics have been heretofore published, the figures that have been published, from time to time, with respect to the breakage of steel or chilled wheels, have not indicated that the latter differ particularly from the former.

Peculiar Feature

A peculiar feature of a number of very serious derailments in recent years is the breakage of wheels under heavy capacity freight cars at the particular time when passenger trains were passing, and the derailment of the passenger train, due to striking the debris of the freight cars thrown on the passenger tracks so suddenly that there was no time to do anything to prevent a wreck.

Between 1890 and 1895, locomotives of 100 tons total weight were used on the Michigan Central railroad, Canada Southern division; 94,000 pounds of the weight was on the driving wheel and 21,840 pounds was on the engine forward truck. The weight of tank, empty, was 43,000 pounds. The weight of the water carried, when the tank was full, was 31,160 pounds. The weight of coal carried, when the engine tender was loaded, was 16,000 pounds. The total weight of the engine and tank, the latter loaded, was thus 206,000 pounds.

The mileage record of 308 wheels,

out of 384 used under these locomotives, follows:

Wheels.	Miles.
122	60,000 to 75,000
97	75,000 to 100,000
39	100,000 to 154,437
1	..... to 181,446
37	40,000 to 60,000
9	30,000 to 40,000
2	25,000 to 30,000
1	..... to 20,755

Seventy-six wheels were good when removed, though taken out on account of wear on opposite wheel, and were put back in other service. Not one of the wheels failed on account of breakage of any kind.

These locomotives were used in fast passenger service, frequently running at over 60 miles per hour, and were first equipped with steel-tired wheels. As the latter were replaced, 33-inch chilled wheels, weighing 650 pounds each, made from mixtures of selected charcoal iron, were used with the above results.

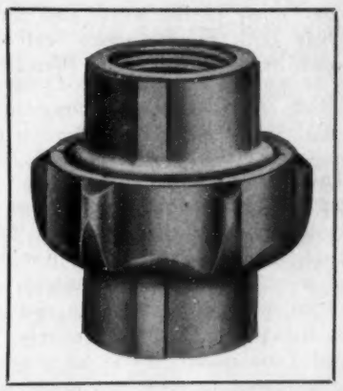
This special instance is given in some detail to show the possibilities of chilled wheels made out of good charcoal iron and of the weight and section indicated, which is nearly 100 pounds below the weight and section of wheel now used under freight cars of 50 tons capacity.

It is, nevertheless, true that wheel service at speeds of 25 to 30 miles per hour, especially on grades and in the case of long and heavy freight trains used in present practice, puts very severe strains upon the wheels with respect to the heating of tread and flange by brake friction. The result of this heating in connection with the quality of iron in the average chilled wheel with its high sulphur content, is the more rapid disintegration due to the fact that the metal is red short, or weak when hot, as all high sulphur metal is.

It must be remembered that the number of car wheels in service is about 25,000,000, including all kinds and descriptions of car wheels in all kinds of service, steam, electric, etc. Also that the output of wheels per day required to provide for renewals and repairs and average new construction is from 20,000 to 25,000 according to industrial and general business conditions. That from 6,000 to 8,000 tons of metal must be used per day to make this product, and that in the case of chilled wheels at least 75 per cent of this material is obtained by the reworking or recasting of wheels removed from service.

It must be remembered that the average load per wheel in steam railroad service has practically doubled in the past 10 or 15 years, and that the operating and metallurgical problems arising out of this fact still remain to be dealt with in very large degree. There is no doubt that a very considerable proportion of the wheels in use under 40 and 50-ton capacity freight cars is in a condition that requires serious and prompt attention. And there is little doubt that the manufacture of chilled wheels of the proper material, the proper analysis, and made under manufacturing conditions that will prove the fact that the necessary quality exists, before the wheels are accepted and put into service, constitutes a serious problem.

Opinions may differ as to the quality of iron that should be used, and no doubt it will be maintained that it is not necessary to use charcoal iron. It must be remembered in this connection that up to 1895 the service of the chilled wheel was satisfactory on the whole, and that it was made exclusively out of charcoal iron in all the years prior to about 1890. The non-charcoal iron wheel came into use about this time, and by 1895 the use of such wheels became dominating so far as the general demand was concerned. By 1900 the manufacture of charcoal iron wheels practically terminated in this country, as indicated by the fact that the consumption of such iron by chilled wheel makers hardly amounted to 10 per cent of the total weight of wheels made.



PRESSED STEEL UNION MANUFACTURED BY THE ROCKWOOD SPRINKLER CO.

Whatever differences there may be in the opinions held by those concerned, the fact seems clear that the quality of chilled wheels made and used since 1900 has not been satisfactory. In ordinary cases of such a kind it might answer to "change the vogue", as it were, and try some new kind of a mixture for chilled wheels that would not be more expensive than the present mixture, and would not necessitate the small change in price that would have to be made if charcoal iron mixtures were used. Considering all the facts in the case, and the very serious responsibilities resting on all concerned, it would seem to be wise to return, at least for the time being, to an order of practice that did produce satisfactory results in the past.

I believe the future of the chilled wheel depends almost entirely on such a change; and if the latter is to receive the serious consideration of a sufficient number of railroad officials, charcoal iron makers, and car wheel manufacturers, and the evidence of that fact appears to a sufficient extent, then it will be necessary to take up the technical questions involved in the manufacture, and to consider and present the changes that should be made in such manufacturing apparatus and practice to insure the desired result.

The Rockwood Pressed Steel Union

In the accompanying illustration is shown a cold-drawn steel union, provided with bronze seats, manufactured by the Rockwood Sprinkler Co., Worcester, Mass. The union is seamless, and as it has the same coefficient of expansion as steel pipe, it expands and contracts in the same proportion, thereby eliminating the possibility of leakage at the threads. The two bronze seats are carefully ground. When tested at a pressure of 1,000 pounds per square inch no leakage is developed in this union. After threading, the union is galvanized by the sherardizing process, thereby protecting all exposed surfaces from rust.

Agreements With Canadian Railroads

The Canadian government has entered into an agreement with the Canadian Pacific and Grand Trunk railways for the construction of a union station at Quebec on the site of the present Palais station, a tunnel from Wolfe's Cove into the station and a station on the Champlain market site to accommodate the river traffic. Another agreement between the government and the city of Quebec provides for the construction of large shops for the National Trans-Continental Railway, at St. Malo, which will be annexed to Quebec city. The shops are to be exempt from taxes and water rates for 20 years.

John G. Brown, Witherspoon building, Philadelphia, is preparing plans and specifications for a three-story brick and concrete warehouse, to be erected at Fifth and Commerce streets, Philadelphia, for the Supplee Hardware Co. Bids will be received in the near future.

The Use of Nodulized Ore in Blast Furnaces

A Discussion of the Excellent Results That Are Being Obtained by the Pennsylvania Steel Co. at One of Its Lebanon, Pa., Stacks

Since the economies in the blast furnace resulting from enriching iron ores are so great, much attention has been paid during the past few years to the various methods of concentrating lean ores, and, as the concentrated ore is usually of extreme fineness, various methods of agglomeration and sintering, of more or less value, have been put into operation. The resulting agglomerated concentrates are generally obtained in the form of briquettes or nodules. The results obtained at a furnace operating exclusively upon nodules, recently were discussed before the American Institute of Mining Engineers by Henry Lee, of the Pennsylvania Steel Co., Lebanon, Pa.

The briquettes naturally divide themselves into two classes, those made by the mixture of some binding agent, and then formed into briquettes under great pressure, and those made by sintering the concentrates, the latter either being formed into bricks before exposure to heat or the sintered mass broken into fragments afterward. The second class of briquettes, or those made by sintering, are simply masses of melted or fused silicate and oxide of iron mingled with more or less silicates of aluminum, lime, and magnesia.

The fact that the material in a briquette is sintered is proof positive that there are no pores in the material. There are, however, quite a number of holes of greater or less diameter through the substance of the briquette. They are not pores in the common acceptance of that term as applied to ores by furnacemen, as the sides of the holes and channels are fused. In reality the material is simply mill cinder. It is practically untouched by the gases in the upper part of the furnace, and the iron has to be reduced by solid carbon in the boshes and hearth. Briquettes sometimes show a little saving in fuel in the furnace over an ore mixture of large lumps, but that saving is made simply because, owing to the numerous holes and channels through the mass, the briquette is practically composed of numerous small or fine lumps, and, as is well known, the finer the ore is, the lower the fuel consumption, other things being equal. The limiting condition on fineness is the high pressure developed by the fine ore clogging the mass of stock in the furnace, and the consequent hanging and slipping, and the irregular distribution of blast.

The value of a sintered ore for blast furnace use depends largely upon the size and physical character of the individual pieces. It has been proven conclusively with a hard magnetic ore that simply crushing the large lumps to 1 or 0.5 inch size will materially reduce the fuel consumption. It is also a well-known fact that an ore with a porous physical structure which is readily permeable by gases is preferable to one with a vitreous texture. It is to this class of sintered products that both briquettes made by heat, and nodules belong. Neither have any pores in the proper sense of the word, and consequently both require more fuel than porous ores, such as soft hematites, etc.

Physical Structure

The physical structure of any sintered product depends more upon its chemical analysis than upon the process of manufacture. It is not true that nodules are vitreous lumps, and that briquettes have an open and porous structure. That is entirely too broad a statement, for in all products agglomerated by heat the binder is a slag, some combination of an oxide of iron with lime, silica, alumina, or all, and sometimes with magnesia in addition.

If the ore is low in iron, say 50 per cent, then any process of sintering will probably produce a clinker similar to mill cinder; that is, the whole mass will fuse completely. At the other extreme, with a very fine magnetite, for example, it is difficult to produce any sintering at all. With ores analyzing from 58 to 64 per cent of iron, the proportion of acid to basic elements in the gangue is important. With Cornwall ore the most infusible mixture is formed when the quotient of the bases (lime and magnesia) divided by the acids (silica and alumina) is between 1/3 and 1/5. The ideal result is obtained when just sufficient slag is formed to bind the grains together in a solid but porous mass.

It is important to have the proper temperature while sintering, and this temperature will of course depend upon the chemical analysis of the materials. It is also important economically to burn the maximum of fuel for the maximum tonnage, and it therefore may be advantageous in certain cases to alter the chemical composition of the material by the addition of lime, or, if the product is a concentrate, by varying the ratio of concentration. Blue billy is one of the easiest ores to treat by any process of sintering, and flue dirt, even after the coke is separated, will almost invariably fuse to a product resembling mill cinder.

The ideal conditions for either briquettes or nodules rarely occur in practice, so that, in estimating the value of these sintered products for a furnace mixture, both briquettes and nodules must be taken as composed of about 98 per cent of mill cinder and 2 per cent of porous ore.

Nodules from concentrates made in a revolving kiln, when of the proper chemical composition (in the case of nodules made from concentrated Cornwall ore this has been shown by experience to be about: Fe, 58; SiO_2, 8; Al_2O_3, 2; CaO, 3; and MgO, 3.50 per cent), run in fines from 0.75 inch in diameter to powder passing through a screen 100 meshes to an inch. The amount of such fines, however, is extremely small.

During a period of six years it has been found that when not more than 2 per cent of the nodules pass the 20-mesh screen the very best results are obtained in the furnace, as to both fuel and production. A large percentage over 0.75 inch in diameter is of no especial advantage except in lightening the pressure of the blast to a slight degree, and the greater the percentage around 0.25 inch in diameter, the better; above this size the nodules seem to require more fuel. Below it the driving of the furnace is retarded by the increased difficulty of blast penetration and distribution.

The size of the nodules depends largely upon the composition of the ore. Sometimes when a lot of lean ore is delivered to the concentrator the resulting nodules may run as low as 54 per cent in iron, with a corresponding increase in the percentage of gangue, but the nodules are always quite coarse; as much as 60 per cent

will remain on the 0.75-inch screen. In this case the blast pressure will at once lessen and the furnace will drive faster.

Again, some rich ore will go through the concentrator, bringing the iron in the nodules up to 60 and even 62 per cent; in this even the nodules will be much finer; sometimes as much as 30 per cent will pass through the 20-mesh screen. After the furnace has been filled for 6 or 8 hours on this mixture the pressure will go up, the driving will slacken, and unless precautions are at once taken the sulphur in the iron will run up, and there may be sticking and hanging unless the pressure be kept down to reasonable limits. As the Pennsylvania Steel Co. at its Lebanon plant runs almost all the time upon low-phosphorus, low-sulphur iron, with whatever silicon the customer demands, it is of great importance that conditions in the furnace be kept regular. The Cornwall ore itself as delivered to the concentrator will vary from 30 per cent iron to 45 per cent with similar variations, of course, in the gangue. To get an absolutely regular product commercially and under working conditions with such varying ore is manifestly impossible, but by attention and study the nodulizing plant has reduced the variations in the iron content of the nodules to an average of from 56 to 60 per cent, and by using a series of holding pits for the concentrates the daily variation in the nodules is rarely over 2 per cent in iron, with corresponding differences in the amount of gangue. The ratio of SiO_2, Al_2O_3, CaO, and MgO among themselves varies hardly at all, so the net result of variations in the iron of the nodules means an equivalent change in the free SiO_2 to be fluxed. As practically all the iron made at the Lebanon furnaces must be low in sulphur (below 0.035), and the silicons demanded are generally low, it is of the greatest importance that the composition of the slag be kept regular, especially so as the coke runs rather high in sulphur, requiring a basic slag at all times, even when on high-silicon iron.

Sampling the Nodules

To enable the furnace department to know the composition of the nodules before they are charged into the furnace, the superintendent of the concentrator has his samplers take a sample from the nodule kilns every hour. These samples are mixed, and every morning a sample from this mixture is taken to the laboratory for analysis, and the result is sent to the furnace office. By this means, before the nodules are filled into the furnace their composition is known, and any change in the lime required is made. No attention is paid to the variations of the iron. Generally speaking, the same fuel is required whether the nodules run 56 or 60 per cent. The leaner nodules, being larger, take more fuel, while the richer ores, although more easily smelted because finer, pack more than the coarse, making the gas distribution less perfect, which in turn increases the demand for fuel, so that practically we find little or no difference between 56 and 60 per cent nodules. The Lebanon plant of the Pennsylvania Steel Co. is the only one that runs a furnace exclusively upon nodules.

Furnace Running on Nodules

The furnace at present in blast is 80 feet high, 11 feet, 6 inches hearth, and 18 feet bosh, with a 13-foot stock line, filled by a skip with bell bottom emptying over the hopper. The bell lever projecting over one side of the hopper has a tendency to create a channel through the stock, owing to its intercepting the materials falling upon it and causing the larger lumps of coke to roll under it. This, however, we combat more or less successfully by means of baffles and other means. There are 10 feet 6 inches tuyeres, and on an average about 30,000 cubic feet of air per minute is blown, which is nearly the usual quantity needed for a furnace of that size on porous ores. We find that 35,000 cubic feet is not too much as far as fuel consumption is concerned, but when more than 30,000 cubic feet of air per minute is put into the furnace the loss in fine nodules blown out of the top is excessive. The slight gain from increased tonnage is offset by an increased amount of nodules required per ton of iron.

Until the concentrating and nodulizing plant at Lebanon was installed the ores used were entirely roasted Cornwall magnetite, running irregularly from 30 to 45 per cent in iron, from 12 to 25 per cent in SiO_2, and alumina, lime, and magnesia in varying amounts, but constant relatively to themselves and to the acids, so that, as with nodules now, the free silica present determines the amount of lime to be added to or taken off the charge. Fortunately, Cornwall ore carries a considerable amount of magnesia, which largely increases the liquidity of the cinder. Were it absent, running a furnace on all Cornwall ore would be almost impossible, as in 24 hours the silica and alumina in the cinder may change from 48 to 38 per cent, and without from 8 to 12 per cent of magnesia the low silica-slag would be so refractory and stiff that it would not run through the cinder monkey. In fact, the presence of magnesia in the Cornwall ore not only enables a furnace to run alone on this ore, but renders it possible to make low-silicon iron with low sulphur. Often, with both roasted Cornwall ore and nodules it is necessary when the coke is high in sulphur to run for months at a time on a cinder carrying only from 40 to 42 per cent of silica and aluminum, and such a cinder would soon clog up a furnace were it not that the magnesia renders such a cinder, in spite of its basicity, as liquid and as free-flowing as the ordinary 48 per cent cinder with lime alone as a base.

In addition to the daily nodule analysis, we also watch the coke very closely, both as to the quality of the coal used and as to the sulphur and ash. From the nature of the coke operation (we use Semet-Solvay by-product coke, with ovens at the plant), it is not possible to secure an analysis of the coke before it is charged into the furnace, but the ash does not vary much; the sulphur, while high, is also pretty regular, but the coals used do at times vary greatly in the mixture, although we use every endeavor to keep the coal mixture as regular as possible. This regularity in coal mixture I regard as the most important single item making for success in blast furnace operation, not only in making low-sulphur iron from high sulphur materials, but with all ores on all kinds of iron. This point has not had the attention paid it that nearly all the other elements concerned in making iron have had from time to time, but in my opinion, based on nearly 30 years' practical direction of blast furnaces, nine-tenths of all furnace troubles would disappear were it possible to always give a furnace a well-burned coke made from a regular unvarying mixture of coals.

Coal Record

A report of the different tonnages of coal charged each day is sent to the blast furnace every morning, and as that coke is not pushed until the next day, we know exactly what mixture is in the furnace, and when any coke of a changed mixture will be filled. As different coals, even when the oven temperatures are the same, differ enormously in the quality of coke they make, this knowledge is of

great value, and enables the furnace superintendent to take any measures he judges best to meet the change. The hardness of the coke made is of great importance in the successful working of nodules.

Success With Nodules

The nodules themselves, being a fine ore, fill more or less the openings between the pieces of coke, and if the pieces of coke are soft, and crumble with a large percentage of breeze, it can easily be seen that the blast will have great difficulty in penetrating and distributing itself through the resulting mass. On the contrary, with hard coke and coarser nodules no difficulty whatever is experienced in using all nodules; the pressures are not high, the fuel is moderate, and the furnace works far more regularly than with Mesabi ores. In fact, all difficulties in working nodules come from softness of the coke and the fineness of the nodules. Where these two elements are absent, a furnace will work as well on nodules of any chemical composition as on any other iron-bearing ore. The chemical composition of the nodules can be taken care of by proper fluxing, but for packing in the furnace through soft coke or excessively fine nodules there is no remedy whatever, and where these two conditions hold a furnace will never run so successfully on all nodules as on gas-reduced ore or ore in lumps.

Fuel Consumption

The amount of fuel needed per ton of iron made from nodules, using well-burned by-product coke made from a mixture of mountain coals, runs from 2,300 to 2,400 pounds in good practice. Little iron is reduced by the gases because of the nature of the nodules, which are but small lumps of mill cinder, requiring solid carbon for reduction; but if the coke happens to be soft the fuel will increase enormously, a vast amount being consumed in the upper part of the stack by the CO_2. With first-class Connellsville beehive coke the fuel would be less, because we have generally noticed that whenever we have charged Connellsville coke the silicon in the iron will jump up, sometimes being raised from around 1.5 to 2.5 per cent in the casts made on the Connellsville coke.

An important point in working on all nodules is the location of the melting point. When too low, although the silicon may be high and the furnace hot, yet the gases will be thin, the pressure very high, and the furnace will slacken in driving to hardly more than half the usual gait. On the other hand, a too high melting point will give gases which, while extremely abundant, will burn with difficulty on account of their dustiness. The pressure will be lower than normal, and the driving fast, but the burden carried will be less than in the best condition, the hearth cooler, and the sulphur kept down in the iron with great difficulty, but with a good production of iron.

Of course these conditions depend entirely on physical causes. In the first instance, the melting point is in the bosh or narrowing part of the furnace, and the area there being contracted there are fewer passages for the blast to go through the sticky mass. In the second case, where the melting point is high, the area of the mass is greater, affording more passages for the gases, and consequently the pressure is less. The important point is to have this sticky level at just the right height, which can easily be told by the general behavior of the furnace, its fuel economy, and its production and quality.

Variations in Fineness of Nodules

The variations in fineness in the nodules require pretty careful watching of the penetration of the blast, and to find out whether the blast is uniformly distributed over the tuyere area the old-time test is used. This consists of driving a bar through a tuyere into the center of the furnace as quickly as possible, allowing it to remain for 2 minutes, withdrawing it rapidly, and examining the bar to see whether it is uniformly heated, or hot in spots. With nodules it seems to be even more important to have a uniform heat over the tuyere area than with ores reduced by the gases. The gases themselves are, like all furnace gases made from hard non-porous magnetites or mill cinders, very low in CO_2 and high in CO, the ratio between CO_2 and CO being from 1:4 to 1:6 instead of from 1:1.8 to 1:2.5 as with gas-reduced ores; consequently they are much less inflammable, and gas explosions are rare or unknown while the blast is on the furnace.

With nodules, as with all other ores, a moderate-sized furnace seems to be more economical than the jumbos. All difficulties from soft coke and fine nodules are increased when our 100-foot furnace is working on all nodules, and harder coke and coarser nodules are required for success than with the 80-foot furnace.

Pennsylvania Leads in Mineral Production

Since the first record of mining statistics was written into the history of the United States, Pennsylvaina has stood at the top of the list. Exclusive of the value of pig iron and of coke and of other derived or secondary products not included in the total made in the state, the value of Pennsylvania's mineral production is nearly one-fourth of that of the entire country and is only about $5,000,000 less than the combined output of Illinois, West Virginia, Ohio and California, the next four states in the value of their mineral production. The value of the mineral production of Pennsylvania reached the enormous total of $414,426,962 in 1911 and the still greater figure of $445,790,022 in 1912, according to a statement prepared by Edward W. Parker, of the United States Geological Survey, in co-operation with the state of Pennsylvania. Pennsylvania holds the leadership primarily on account of her supremacy in the production of coal.

Pennsylvania produces little iron ore, its output amounting to only about 500,000 long tons, but it has in the city of Pittsburgh and vicinity the largest iron-making district of the world, the iron ores coming chiefly from the Lake Superior region. The production of pig iron in Pennsylvania as a whole amounted to 12,437,685 long tons, valued at $181,569,299, in 1912, against 9,581,109 long tons, valued at $136,328,507, in 1911. If the value of the pig iron made in Pennsylvania were added to its total annual mineral production, the total output for the state would be valued at over $600,000,000, nearly one-third of the total for the United States. Exclusive of the pig iron, the value of Pennsylvania's mineral production is equal to nearly 25 per cent of the total for the country.

Strike at Pope Plant Settled

The Pope mill of the Phillips Sheet & Tin Plate Co., at Steubenville, O., consisting of 12 mills, will resume operations some time this month. The plant has been idle since July 1, when a strike was declared by the Amalgamated Association of Iron, Steel and Tin Workers, because of a difference regarding wage agreements. Although owners of the mill have not entered into an agreement with officers of the union, the question of wages has been taken up with former employes, who will return to work at the same scale paid members of the association at other plants. Approximately 900 men are affected.

IRON AND STEEL MARKETS

Decided Change for Better in All Products

Although Pig Iron Buying Was Brought Out by Low Prices—Railroads Figure in New Activity—Advancing Prices on Finished Material for Future Delivery

BY GEORGE SMART

New business far beyond expectations and most encouraging developed during the first week of the New Year. While it is true that in the case of pig iron extremely low prices have been made, there is strong evidence that this buying is for actual consumption and reason to believe that prices will slowly advance, while in finished materials new business was not brought out by concessions from recent quotations and higher prices are being asked for delivery on leading products after the first quarter of the year. On the whole, the feeling in the trade is far more optimistic than it has been for many months.

Railroad Buying

Railroads have contributed to the general increase in activity and tonnages of rails either actually distributed to mills or practically closed are: New York Central, 70,000 tons, about half of the requirements for the year; Erie railroad, 35,000 tons; Lackawanna, 15,000 tons; Lehigh Valley & New England, 4,000 tons. The Southern Railroad is inquiring for 20,000 tons additional. The Union Pacific order for 5,000 cars is regarded as practically closed and the Clover Leaf has awarded 5,000 cars to Haskell & Barker. The Hocking Valley has ordered 1,000 cars from the Cambria Steel Co. The Norfolk & Western has awarded 5,000 kegs of spikes to the Republic Iron & Steel Co. The Chesapeake & Ohio will close for 1,000 cars this week. The Ralston Steel Car Co. has ordered 10,000 tons of steel car material and the Pressed Steel Car Co., 20,000 tons.

Pig Iron

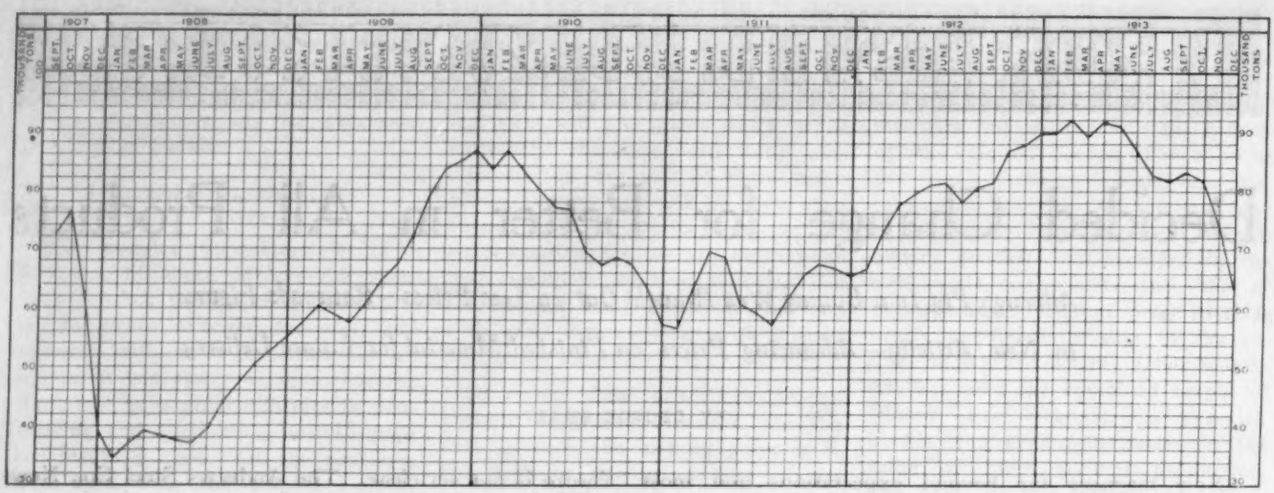
The tonnage of pig iron sold during the past week has been very heavy. A large part of this buying was the result of extremely aggressive policies adopted by some furnaces, especially a few along Lake Erie. In some cases, the lowest prices made in 15 years were quoted. Buffalo furnaces carried their campaign to far distant points on a basis as low as $12, furnace, for No. 2 plain, selling not only in competition with eastern Pennsylvania iron, in that iron's nearby territory, but offering iron as far south as Virginia and going into the Detroit and Pittsburgh districts. The naming of low prices by Buffalo furnaces aroused the makers who considered that their own districts were invaded and there was a spectacular chase for business. Following the price cutting and the selling of large tonnages, the market has shown more firmness, but the future is not yet clear. The Andrews Steel Co., Newport, Ky., has placed 20,000 tons of basic for first half delivery and reports vary as to the sellers, but it is believed that while a Cleveland firm got part of the tonnage, the larger part went to a southern maker at $10.50, Birmingham. The United Steel Co., Canton, is in the market for 7,000 tons of basic. The American Steel Foundries is inquiring for 6,000 to 10,000 tons for delivery at Alliance. The United States Cast Iron Pipe & Foundry Co. has entered the market for 60,000 tons of low grade iron. Although southern furnaces are somewhat firmer, there is apparently no doubt about a price of $10.50 for No. 2 being still made for first quarter delivery by an important maker. The Central Foundry Co. has purchased 6,000 tons of foundry grades. The General Electric is inquiring for 5,000 tons of foundry and low phosphorus. Business pending in the New York district amounts to from 15,000 to 20,000 tons.

Finished Materials

There is a very decided increase in inquiry and actual new business in nearly all kinds of finished materials. Contracting, especially for steel bars in the central west, has been heavy for the first and second quarter. The general policy of the mills is conservative and the rule is to ask $1 more for delivery in the second quarter than in the first. Gradually the lowest quotations which have been made, such as 1.15c on plates, shapes and bars for early delivery, are being withdrawn. Sheets show considerable increase in firmness as the result of greater demand. There is much better tone in the wire market, in which an advance in prices is probable.

Pig Iron Production

An illustration of how suddenly pig iron production can change is furnished by the figures for December and November. In December, production was the smallest of any month in the past two years and 253,822 tons less than for November, which had shown a similar decrease, although the total production of coke and anthracite pig iron for the year was the greatest on record, being 30,652,767 tons, compared with 29,325,513 in 1912, which was also a record-breaking year. The output of charcoal iron is estimated at 300,000 tons, making the total output of pig iron in 1913 about 30,950,000 tons. The outlook is that a further sharp decline in production will take place this month. A number of furnaces are already listed to blow out during the next few weeks.



Daily Average Output of Coke and Anthracite Pig Iron

Record Year Ends With Low Pig Iron Output

By R V Sawhill

With the smallest production of any month in more than two years, and the fewest stacks in blast since September, 1908, December brought to a close a record-breaking year in the output of pig iron.

The total production of coke and anthracite pig iron in 1913 was 30,652,767 tons, compared with 29,325,513 tons in 1912, the previous record-holding year. Last year's gain was 1,327,254 tons over 1912 and 3,800,000 tons over 1910, which year ranks third. The output of charcoal iron was 300,000 tons, making the total output of pig iron in 1913, 30,950,000 tons.

December's production was 1,976,138 tons, against 2,229,960 tons in November, a short month, a loss last month of 253,822 tons. This loss was the result of the slackening in the activities of the steel works or non-merchant blast furnaces, as the merchant furnaces made a small gain over November. Last month's production compares with 2,777,292 tons in December, 1912, a loss of 801,154 tons. It was the first time in 25 months that output had fallen under 2,000,000 tons.

The most interesting fact revealed by the December pig iron figures, is the sharp decrease in the number of furnaces in blast. Active stacks on the last day of December numbered 191, a loss of 34 during the month, 225 being in blast on Nov. 30. The loss since Feb. 28, which marked the highest point in the year's activity, is 115 stacks, 306 being in blast on that date. There were 291 stacks blowing on Dec. 31, 1912, 100 more than on the closing day of 1913. The number of furnaces in blast on the last day of 1911 was 215; 1910, 193; 1909, 314; 1908, 221; 1907, 154. On Sept. 30, 1908, there were 189 active furnaces, last month showing the fewest active stacks in more than five years.

The average daily production in 1913 was 83,980 tons, while December's daily rate was only 63,746 tons, a loss from the year's average of 20,234 tons. Last month's output was at the rate of 23,270,000 tons annually. The daily average production in 1912 was 80,124 tons; in 1911, 63,558 tons, and in 1910, 73,549 tons. The gain in 1913 over

Table I.

DECEMBER PIG IRON

States.	No. of stacks.	No. in blast last day of month.		Total tonnage made.		——Totals.——	
		Dec.	Nov.	Merchant.	Non-Merchant.	Dec.	Nov.
Pennsylvania	158	77	94	165,344	681,144	846,488	970,488
Ohio	73	39	51	178,264	273,808	452,072	521,062
Alabama	45	21	21	112,760	49,586	162,346	160,059
Virginia	22	7	8	28,481	.....	28,481	28,314
New York	27	12	12	79,838	33,498	113,336	131,688
New Jersey	7	2	2	11,790	.....	11,790	11,290
Illinois	26	13	15	28,830	131,071	159,901	184,502
Colorado	6	1	1				
Indiana	10	5	7				
Maryland	4	1	2				
Wisconsin	6	3	2	17,036	109,011	126,047	138,156
Kentucky	7	1	1				
West Virginia	4	1	2				
Tennessee	18	4	3				
Washington	1	0	0	20,639	12,587	33,226	34,050
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	1	1	1				
Michigan	3	3	3				
Missouri	1	0	0	25,956	.....	25,956	24,596
Spiegel—All states						2,667	10,954
Ferro—All states						13,828	14,801
Totals	424	191	225	668,938	1,290,705	1,976,138	2,229,960

Table II.

DAILY AVERAGE RECORD.

	Tons.
September, 1909	79,186
October, 1909	84,001
November, 1909	84,425
December, 1909	86,539
February, 1910	86,748
November, 1912	87,985
December, 1912	89,590
January, 1913	89,929
February, 1913	92,095

Table III.

MONTHLY PRODUCTION RECORD.

	Tons.
October, 1907	2,359,690
September, 1909	2,375,589
October, 1909	2,604,037
December, 1909	2,682,702
October, 1912	2,683,645
December, 1912	2,777,292
January, 1913	2,787,800
May, 1913	2,816,825

Table IV.

MONTHLY PRODUCTION OF MERCHANT BLAST FURNACES, BY STATES, DURING 1913

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	First half.	Second half.	Grand total.
Pa.	227,713	209,918	229,268	224,515	208,115	189,186	180,518	174,808	163,902	163,071	151,011	165,344	1,288,715	998,654	2,287,369
Ohio	161,123	171,108	175,003	148,988	196,941	186,832	187,023	192,966	191,710	201,467	173,491	178,264	1,039,995	1,124,921	2,164,916
Ala.	116,922	107,763	126,458	114,543	108,843	97,540	93,259	97,686	95,786	108,763	120,693	112,760	672,069	628,947	1,301,016
Va.	26,616	32,151	33,496	33,901	32,324	32,928	25,959	25,488	16,985	23,622	28,314	28,481	191,416	147,849	339,265
N. Y.	90,148	87,805	96,319	96,545	98,088	91,328	79,910	74,710	74,988	78,563	75,917	79,838	560,233	463,926	1,024,159
N. J.	5,833	5,644	11,100	10,154	10,906	10,996	10,922	10,981	10,769	11,236	11,290	11,790	54,633	66,979	121,612
Ill.	50,348	45,662	51,973	47,554	50,513	44,264	34,555	25,281	25,440	27,345	26,848	28,830	290,314	168,299	458,613
Colorado, Indiana, Maryland, Wis. Kentucky, W. Va., Tenn.,	26,653	25,957	29,640	30,520	29,585	23,971	23,652	13,544	12,002	12,640	12,124	17,036	166,326	90,998	257,324
Wash. Ga., Texas, Minn., Mich.,	41,838	39,148	42,527	33,595	34,973	23,158	22,884	22,656	21,481	22,398	21,219	20,639	215,239	131,277	346,516
Mo.	27,014	23,340	25,549	22,455	15,843	16,548	17,201	21,243	25,080	25,593	24,596	25,956	130,749	139,669	270,418
Totals	774,208	748,496	821,333	762,770	786,131	716,751	675,883	659,363	638,134	673,698	645,503	668,938	4,609,689	3,961,519	8,571,208

Table V.

MONTHLY PRODUCTION OF NON-MERCHANT BLAST FURNACES, BY STATES, DURING 1913

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	First half.	Second half.	Grand total.
Pa.	934,331	854,388	945,448	954,751	938,548	854,740	851,398	851,929	853,604	922,383	819,477	681,144	5,482,206	4,979,935	10,462,141
Ohio	464,050	416,969	400,261	430,544	467,992	434,675	429,671	435,601	426,114	432,255	347,571	273,808	2,614,491	2,345,020	4,959,511
Ala.	63,895	57,025	60,482	70,713	70,360	65,985	67,305	65,580	61,463	52,602	39,306	49,586	388,460	335,902	724,362
Va.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Y.	103,580	92,259	91,757	92,448	94,622	94,642	97,462	107,587	105,539	81,457	55,771	33,498	569,308	481,314	1,050,622
N. J.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ill.	230,620	207,287	229,865	228,286	239,968	226,682	212,155	202,114	196,781	173,091	157,654	131,071	1,362,708	1,072,866	2,435,574
Colorado, Indiana, Maryland Wis. Kentucky, W. Va., Tenn.,	177,153	158,538	171,021	169,198	173,056	175,571	177,482	171,343	170,640	167,551	126,032	109,011	1,024,537	922,059	1,946,596
Wash. Ga., Texas, Minn., Mich.,	20,734	21,964	18,916	19,635	24,306	24,025	23,704	22,821	14,741	14,414	12,831	12,587	129,580	101,098	230,678
Mo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tot'l	1,994,363	1,808,430	1,917,750	1,965,575	2,008,852	1,876,320	1,859,177	1,856,975	1,828,882	1,843,753	1,558,702	1,290,705	11,571,290	10,238,194	21,809,484

1912 was 3,856 tons. Last year witnessed a new record in daily average production, the rate during February being 92,095 tons.

The output in the last half of 1913 was 14,335,413 tons, compared with 16,317,354 tons in the first half of 1913; 15,447,683 in the last half of 1912; 13,877,830 tons in the first half of 1912; 11,795,320 tons in the second half of 1911; 11,403,281 tons in the first half of 1911; 12,086,867 tons in the second half of 1910; 14,758,447 tons in the first half of 1910; 14,516,330 tons in the second half of 1909, and 10,820,672 tons in the first half of 1909. The loss in the second half of last year from the first six months of 1913 was 1,981,941 tons. The record for 12 consecutive months was set in October, 1912, to September, 1913, inclusive, at 32,007,244 tons.

Merchant Iron Output

The output of the merchant furnaces in 1913 was 8,571,208 tons, compared with 7,371,735 tons in 1912; 6,409,246 tons in 1911, and 8,757,925 tons in 1910. The production in the second half of 1913 was 3,961,519 tons; in the first half of 1913, 4,609,689 tons; in the second half of 1912, 4,023,031 tons; in the first half of 1912, 3,348,704 tons; in the second half of 1911, 3,007,185 tons; in the first half of 1911, 3,402,061 tons; in the second half of 1910, 3,950,281 tons; in the first half of 1910, 4,807,644 tons.

Non-Merchant Production

The steel works or non-merchant furnaces produced 21,809,484 tons in 1913, compared with 21,676,945 tons in 1912; 16,553,143 tons in 1911, and 17,796,765 tons in 1910. The output of non-merchant iron in the last half of 1913 was 10,238,194 tons, against 11,571,290 tons in the first half of 1913; 11,275,918 tons in the second half of 1912; 10,401,027 tons in the first half of 1912; 8,654,636 tons in the second half of 1911; 7,898,507 tons in the first half of 1911; 8,016,780 tons in the second half of 1910, and 9,779,985 tons in the first half of 1910.

Table VI.

ACTIVE STACKS ON LAST DAY OF MONTH FOR PAST SEVEN YEARS.

	1907.	1908.	1909.	1910.	1911.	1912.	1913.
Jan.	311	139	234	311	210	227	297
Feb.	308	150	233	311	226	235	306
Mar.	304	154	229	310	236	237	278
Apr.	327	146	224	291	220	239	297
May	329	145	236	279	206	243	285
June	341	154	240	271	202	242	283
July	335	166	258	254	196	245	264
Aug.	329	181	278	244	206	254	260
Sept.	328	189	297	234	216	262	258
Oct.	314	200	309	230	214	280	244
Nov.	226	212	311	218	214	289	225
Dec.	154	221	314	193	215	291	191
Aver.	301	171	264	262	213	254	266

December Production

The production of merchant iron in December was 668,938 tons against 645,503 tons in November, a gain of 23,435 tons. The non-merchant furnaces produced 1,290,705 tons in December and 1,558,702 tons in November, a loss of 267,997 tons. Non-merchant production in May, 1913, set a new mark at 2,008,852 tons, the loss in December, seven months later, being 700,000 tons.

Of the net loss of 34 stacks shown in December, 33 were steel works furnaces, and one a merchant furnace. One non-merchant furnace was re-

The daily average output during December was 63,746 tons, against 74,332 tons in November, a loss of 10,586 tons. This loss was borne by the steel works furnaces, their daily rate of production in December being 41,636 tons and in November 52,169 tons, a loss last month of 10,533 tons. The merchant furnaces maintained an average daily output of 21,579 tons in December and 21,309 tons in November, a gain of 270 tons.

Table VII.

HOW NEW PIG IRON RECORD WAS MADE IN 1913

	Merchant.	Non-Merchant.	Ferro.	Spiegel.	Totals.
January	774,208	1,994,363	7,125	12,104	2,787,800
February	748,496	1,808,430	9,837	11,907	2,578,670
March	821,333	1,917,750	17,286	6,454	2,762,823
April	762,770	1,965,575	16,752	9,256	2,754,353
May	786,131	2,008,852	11,168	10,674	2,816,825
June	716,751	1,876,320	17,403	6,409	2,616,883
First half	4,609,689	11,571,290	79,571	56,804	16,317,354
July	675,883	1,859,177	10,848	12,367	2,558,275
August	659,363	1,856,975	10,944	9,736	2,537,018
September	638,134	1,828,882	15,463	11,619	2,494,098
October	673,698	1,843,753	16,314	6,159	2,539,924
November	645,503	1,558,702	14,801	10,954	2,229,960
December	668,938	1,290,705	13,828	2,667	1,976,138
Second half	3,961,519	10,238,194	82,198	53,502	14,335,413
Grand total	8,571,208	21,809,484	161,769	110,306	30,652,767

lighted in December and 34 blew out. Five merchant stacks were blown in and six blown out.

Ferro and Spiegel

The production of ferro last year was 161,769 tons compared with 180,699 tons in 1912, and 125,739 tons in 1911. The output in the second half of 1913 was 82,198 tons, against 79,571 tons in the first half. The output in December was 13,828 tons, compared with 14,801 tons in November.

The output of spiegel in 1913 was 110,306 tons, compared with 96,134 tons in 1912, and 110,473 tons in 1911. The production in the second half of 1913 was 53,502 tons, against 56,804 tons in the first half. In December, the production was 2,667 tons, against 10,954 tons in November.

What the Tables Show

The accompanying tables give a complete record of the country's blast furnace activities for seven years, with detailed figures for 1913. Table I shows the December record of output and stack activities; Tables II and III show how new daily and monthly records have been established. Tables IV and V are new in pig iron statistics, and show the individual record of each state by months, for both merchant and non-merchant production. Table VI is a complete record of stack activities since January, 1907. Table VII shows the 1913 record of merchant, non-merchant, ferro and spiegel production in detail. Tables VIII and IX show the daily and monthly production for the past seven years.

Table VIII.

AVERAGE DAILY PRODUCTION OF PIG IRON FROM JAN. 1, 1907, TO JAN. 1, 1914

	1907.	1908.	1909.	1910.	1911.	1912.	1913.
January	70,800	33,657	57,683	83,871	56,989	66,220	89,929
February	73,108	37,476	60,088	86,748	63,617	72,372	92,095
March	71,507	39,673	58,795	83,508	69,863	77,791	89,123
April	74,224	38,504	57,687	82,590	68,163	79,254	91,812
May	73,904	37,677	60,218	76,607	60,367	80,753	90,865
June	74,581	36,877	64,334	76,276	59,109	81,125	87,229
July	72,685	39,632	67,375	69,617	57,294	77,502	82,525
August	72,376	44,065	72,021	67,864	61,995	80,650	81,389
September	72,472	47,208	79,186	68,282	65,797	81,482	83,137
October	76,119	50,769	84,001	67,297	67,486	86,569	81,933
November	60,685	52,744	84,425	63,679	66,637	87,985	74,322
December	39,830	55,602	86,539	57,416	65,558	89,590	63,746
Average	69,314	42,842	69,416	73,549	63,558	80,124	83,980

The McIntyre Iron Co. took over the Cedar Point furnace of the Northern Iron Co., on Jan. 1, and began operations under a six months' lease, for experimenting with the reduction of titaniferous ores.

The Wickwire Steel Co., Buffalo, N. Y., will blow out its Harriet "X" furnace this week.

The Columbus Iron & Steel Co., Columbus, O., advises that it blew out one of its Buckeye stacks on Dec. 31, and will not resume until prices have materially improved.

The Delaware River Steel Co., Chester, Pa., advises its Delaware river stack made more iron in December than in any other month in its history

The Clinton furnace of the Clinton Iron & Steel Co., Pittsburgh, which toppled over April 23, blew in Dec. 4, after being rebuilt.

The Lynchburg, Va., stack of the Oriskany Ore & Iron Corporation blew out Dec. 18, and the company will install a new water system. Operations will be resumed about Jan. 15.

Alice furnace of the Valley Mold & Iron Co., Sharpsville, Pa., has been blown out while the plant is closed for repairs and additions.

The Central Iron & Steel Co. will blow out its No. 1 Paxton furnace at Harrisburg, which has been in operation over a year. The three furnaces in Harrisburg now are idle.

Table IX.

MONTHLY PRODUCTION OF PIG IRON FOR PAST SEVEN YEARS

	1907.	1908.	1909.	1910.	1911.	1912.	1913.
January	2,194,801	1,043,374	1,788,164	2,599,995	1,766,658	2,052,806	2,787,800
February	2,047,036	1,086,809	1,682,470	2,428,937	1,781,285	2,098,796	2,578,670
March	2,216,709	1,229,856	1,822,644	2,588,736	2,165,764	2,411,529	2,762,823
April	2,226,708	1,155,122	1,730,608	2,477,700	2,044,904	2,377,621	2,754,353
May	2,291,030	1,168,002	1,866,757	2,374,802	1,871,388	2,503,341	2,816,825
June	2,237,420	1,106,300	1,930,029	2,288,279	1,773,282	2,433,737	2,616,883
July	2,253,243	1,228,604	2,088,620	2,158,124	1,776,108	2,402,567	2,558,275
August	2,243,656	1,366,019	2,232,642	2,103,791	1,921,832	2,500,163	2,537,018
September	2,174,148	1,416,252	2,375,589	2,048,461	1,973,918	2,444,454	2,494,098
October	2,359,690	1,573,824	2,604,037	2,086,205	2,092,061	2,683,645	2,539,924
November	1,820,558	1,582,314	2,532,740	1,910,385	1,999,100	2,639,562	2,229,960
December	1,234,733	1,723,664	2,682,702	1,779,899	2,032,301	2,777,292	1,976,138
Totals	25,299,732	15,680,140	25,337,002	26,845,314	23,198,601	29,325,513	30,652,767

STEEL MAKING IRONS

Bessemer and Basic Averages for December and the Year.

The average realized price on Bessemer and basic pig iron in 1913 was $16.1884 and $14.6319, valley furnace, according to monthly averages on sales of 1,000 tons or more, announced These figures are $1.09 and $1.63, respectively, above the averages estabeach month by W. P. Snyder & Co. lished in 1912, but it is recalled that the bulk of the tonnage sold in 1913 was obtained at comparatively low figures. In December, Bessemer and basic sales averaged $14.842 and $12.523, respectively, at valley points.

Monthly averages for the last two years follow:

	Bessemer		Basic	
	1913.	1912.	1913.	1912.
Jan.	$17.25	$14.078	$16.45	$12.372
Feb.	17.25	14.00	16.317	12.25
Mar.	17.25	14.0536	16.059	12.76
Apr.	17.008	14.25	15.714	12.981
May	16.78	14.2345	14.899	13.00
June	16.2375	14.25	14.50	13.209
July	15.4085	14.25	14.227	13.48
Aug.	15.657	14.534	14.045	14.00
Sept.	15.75	15.962	14.1375	15.134
Oct.	15.703	17.00	13.709	16.184
Nov.	15.125	17.172	13.013	16.192
Dec.	14.842	17.2962	12.523	16.4486
Average for year	16.1884	15.090	14.6319	14.001

Bureau of Safety.—A unanimous report favorable to the creation of a bureau of labor safety, which shall be attached to the department of labor, has been adopted by the house committee on labor. The bill was introduced by Minority Leader Mann, of Illinois, who collaborated on the measure and the report with Representative Bremmer, Democrat, of New Jersey.

Pig Iron More Active at Pittsburgh

But Very Low Prices Are Made—Rumors of Disagreement Among Coke Producers—Scrap Shows Signs of Strength

BY C. F. WILLIAMS

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Pittsburgh, Jan. 6.

Sentiment in the iron and steel trade in this district has improved considerably since the close of last year. Better feeling has been caused, apparently, by more liberal inquiry for first and second quarter material; it is not the result of advancing prices, for quotations continue irregular and somewhat uncertain, despite efforts of the more important manufacturers to establish satisfactory price levels. Mill operations are far from 50 per cent of capacity, but it is not believed that schedules will be further reduced. There is fairly heavy demand for semi-finished and finished products; pig iron is active, but decidedly weak; scrap has reflected strength, but coke is holding the center of the stage. Oil Country goods were reduced Jan. 2 by the National Tube Co., about $2 a ton.

Pig Iron

The market is more active than it has been in several months, but low prices prevail. The Andrews Steel Co., Newport, Ky., has closed for 20,000 tons of first half basic with Corrigan, McKinney & Co., Cleveland, at a decidedly low figure. This interest has not yet shut down its furnaces, as was announced a week ago. The Standard Sanitary Mfg. Co. has taken 2,000 tons of No. 2 and 750 tons of No. 3 southern foundry, at $10.75 and $10.25, Birmingham, respectively, for early shipment to its Louisville plant, Louisville, Ky., and this interest has closed negotiations for about 4,000 tons of northern foundry, at less than $13, valley, for its Pittsburgh and New Brighton works. The Westinghouse Air Brake Co. has taken about 6,000 tons of foundry, malleable and gray forge irons for shipment to Wilmerding, Pa. Steel companies are figuring in the basic market; one concern wants 2,000 tons a month for first half, and another is asking bids on 5,000 tons for first quarter. Reports that Buffalo interests have sold foundry in this district are claimed to be without foundation, although a small sale of Buffalo malleable has been made in this territory. Inquiry for basic, Bessemer, malleable and foundry is fairly heavy, but prices unsatisfactory.

Ferro-Alloys

Interest is taken in an announcement that the manufacture of ferro-manganese is contemplated by Philadelphia interests at the Dunbar furnace, Dunbar, Pa., which has been idle several years because of litigation. British makers have reduced their price to $45, seaboard, for 80 per cent ferro-manganese.

Plates and Shapes

Inquiry for first and second quarter shipment is heavier, and manufacturers are more optimistic than a fortnight ago. Plates, shapes and bars are being held at 1.20c for first quarter, although reports continue to be heard that plates and bars are selling at 1.15c in some instances. Several makers are quoting 1.25c for second quarter.

Sheets and Tin Plate

Low prices have been responsible for fairly heavy buying; black and galvanized sheets have sold at 1.80c and 2.80c, respectively, for No. 28 gage, although those figures have not been general. That some makers no longer expect to offer material at prevailing minimums is indicated by the fact that these figures have been withdrawn in several instances. Specifications last month were more liberal than in November.

Specifying of tin plate is fairly heavy. Although $3.40 has represented the open market for base size tins, the bulk of the material sold for this year was obtained at about $2 a ton under that price.

Rails and Track Material

Rail buying has not been heavy, although mills are receiving numerous small orders. Demand for spikes and other track equipment is heavy, but prices are low and irregular.

Semi-Finished Iron and Steel

Consumers are figuring in the market for first half needs, and numerous sales are being made quietly. Billets are being held at $20, mill, and sheet bars at $21, mill, although it is reported that some makers have sold small tonnages of sheet bars at $20.50.

There is some demand for muck bar, but it is difficult to obtain a line on prices. This product is nominally quoted at $29, Pittsburgh.

Hoops are nominally quoted at 1.40c; bands are commanding 1.20c. The market for both products is quiet.

Iron and Steel Bars

Nut, bolt and rivet makers, automobile interests and shafting manufacturers are negotiating for first half bar requirements. Bar steel is being held at 1.20c, although rumors of lower prices are heard. Bar iron continues to reflect weakness, and 1.30c can be done here.

Tubular Goods

On Jan. 2, the National Tube Co. reverted prices of oil country goods back to those of Jan. 1, 1913, and all grades of steel pipe now are being sold at prices provided by cards of a year ago. Iron pipe discounts and iron and steel boiler tubes have not been changed.

Bolts, Nuts and Rivets

Rivets are obtainable at about $2 a ton under prices which had nominally represented the market. Nuts and bolts are obtainable at considerably less than prevailing prices.

Wire Products

Wire nails continue to be listed at $1.55 a keg, although material is being sold, in some cases, at $1 a ton under that figure. The market is decidedly dull. Open-hearth and Bessemer wire rods are listed at $25.50, Pittsburgh, for small tonnages.

Coke

Numerous reports have been heard this week concerning the Producers' Coke Co., selling agent for 19 companies owning more than 5,000 ovens. In some quarters, it is rumored several operating companies have decided to market their own fuel, and in others it is claimed the organization will remain intact, but will reduce its price, $2, ovens, for first half. Both reports, however, are strenuously denied by J. P. Brennan, president of the Producers' company, who says that no change in price has been made, and that there has been no defection. Furnace coke appears slightly firmer than a week ago, despite the fight against the $2 price. Pickands, Mather & Co., Cleveland, continue to operate stacks, but have not yet bought 1914 coke. Production of coke last year, according to the Connellsville Courier, was 20,078,579 tons, breaking all previous records.

Old Material

For the first time in more than a year, iron and steel scrap is showing some strength, although it remains to be seen whether the present rise is of the soda water variety. Heavy melting steel and several other grades have advanced 25 cents a ton.

Chicago Mills Unwilling to Contract

At Present Prices and Buyers Not Ready to Pay More—Larger Volume of Prompt Orders—Good Pig Iron Inquiry

BY H. COLE ESTEP

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Chicago, Jan. 6.

Speaking generally, the steel makers are firm in their determination not to contract for future delivery at present prices, feeling that they are entitled to share in the benefits of an advancing market. Buyers on the other hand are unwilling to pay more than current quotations and seem to think that, if they hold on long enough, the manufacturers will be brought to terms. As a result of this failure to find a meeting ground, buying is very light and the situation has not developed perceptibly so far this year. Encouragement is derived from the improved sentiment which permeates all branches of the trade together with a larger volume of hand-to-mouth business. Scattering railroad orders for structural material are appearing. Standard rail buying in the west is at a standstill. Scrap prices are stationary and the old material market is featured by heavy offerings of rerolling rails.

Pig Iron

The volume of business has improved materially. Sales in the Chicago district during the past week aggregated approximately 30,000 tons, of which 23,000 tons were northern foundry and malleable irons. Very little of the latter, however, is included in the totals. The buying is exceptionally well scattered and includes all classes of business. The inquiry still pending is large, although somewhat less than it was a week ago. It includes 3,000 tons of foundry iron which will probably be placed in a short time by the Crane Co., and a block of 1,500 tons of southern iron for which the Acme Harvesting Machine Co., of Peoria, is negotiating. The American Steel Foundries has purchased between 1,500 and 2,000 tons of 10 per cent silicon iron. As a result of this and other sales, a new price level has been established for high silicon iron based on $16, Jackson county furnace, for 8 per cent, equivalent to $18.40, Chicago. This is believed to represent the general run of business, although $16, furnace, has been shaded in one or two instances. Chicago prices on standard foundry iron are unchanged, but the leading southern producer is now openly offering No. 2 at $10.50, Birmingham, for first quarter.

Merchant Bars

The steel bar situation is developing slowly. Current business improved slightly during the opening week of the new year and the pressure from buyers who wish to contract at present prices is somewhat stronger. The steel companies, however, are determined to reap a portion of the benefit which will arise from improved market conditions and most of them are not anxious for contracts even at an advance. Two of the independent mills represented in this territory have taken some bar business for first quarter delivery at 1.38c, Chicago, and for second quarter at 1.43c, equivalent to 1.20c and 1.25c, Pittsburgh, respectively. The demand for hard steel is quiet. After a shutdown extending over the holidays, the iron mills have resumed with fair orders. Bar iron prices are a trifle firmer and the 1.12c, Chicago, price has disappeared for the time being. Shafting is irregular.

Plates and Structurals

The year opens with mill order books carrying very little business and with the tonnage which comes in from day to day running about 60 per cent capacity. Sentiment remains cheerful, but a buying movement in heavy finished steel is hardly to be expected this month. For prompt shipment, 1.15c, Pittsburgh, is the ruling quotation. A few first quarter contracts have been made at 1.20c, Pittsburgh, but it is now evident that the bulk of the first quarter business will be transacted at $1 less than this figure.

Rails and Track Fastenings

Orders for track fastenings are fairly good with angle bars at 1.50c and spikes at 1.50c to 1.55c, Chicago. The 1.45c price on spikes, which was current during a part of last month, has disappeared. There is no activity in standard rails and the rail mills in this territory now have less business than ever before in their history. Orders for light rails are scattering and do not aggregate a large tonnage.

Sheets

The mills are receiving a fair volume of business from day to day for immediate rolling. The local producers are unwilling to contract except for the first quarter. Prices are unchanged, No. 28 galvanized being 3.03c and No. 28 black 2.03c, Chicago. The American Sheet & Tin Plate Co. has resumed operations at the Gary plant after a shut-down of 10 days. The Inland Steel Co. is operating eight of its 18 hot mills at present.

Wire Products

There is no contracting and the condition of the wire trade in this market remains unchanged. Considerable tonnage was carried over from 1913. Jobbers are finding that their stocks are moving slowly and the indications are that the business reaction has not fully run its course in mercantile lines.

Cast Iron Pipe

More business is pending than at any time for the past six months. The United States Cast Iron Pipe & Foundry Co. is low bidder on 12,000 tons of water pipe for the city of Chicago and will undoubtedly be awarded the contract. The same maker has taken 500 tons at Kansas City. Bids on 3,230 tons of water pipe will be opened at St. Paul Jan. 12. Bids for 1,000 tons will be opened at Winnipeg on Jan. 9. There is a fair sprinkling of orders for gas pipe.

Merchant Pipe and Tubes

The exceptionally mild winter has had a beneficial influence on the demand for house pipe. Orders, therefore, are fair and discounts well maintained. The local mills continue to enjoy activity. There are no large inquiries for boiler tubes, but most of the railroads are placing small orders to cover their current requirements.

Bolts, Nuts and Rivets

Inquiry has improved during the past 10 days and sales are a trifle better. Business, of course, remains on a hand-to-mouth basis and owing to the large manufacturing capacity in this territory, prices show very little tendency to improve. Some of the indiscriminate cutting which was common in December has disappeared.

Old Material

Sentimentally the market has improved and already some dealers have commenced marking up prices. Consumption, however, remains at a minimum and no extensive advances can be looked for until the general situation clarifies itself to a greater extent. Prices have changed very little during the past three weeks. Rerolling rails constitute the only weak item on the list and owing to large offerings have sold down to a minimum of $11 per gross ton. The heavy railroad offerings of last week were well absorbed.

Increased Sales in Cleveland District

Pig Iron Business Heavier Than for Many Months—Active Contracting for Finished Materials—Bluffing to Bear Coke Market Fails

BY GEORGE SMART

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Penton Bldg.,
Cleveland, Jan. 6.

Surprising increase in activity in pig iron and finished materials has developed during the first week of the New Year. While extremely low prices have been made on basic pig iron, the developments upon the whole are regarded as highly encouraging.

Iron Ore

The 1914 program has not yet been taken up by the ore shippers and it looks now as though nothing would be done until March. Chartering of vessel property will probably not begin until a few days before the opening of navigation. The expectation is that the carrying rate will remain as it is. Shipments of ore from dock to furnaces were larger during December than was expected, though not as large as the shipments for the corresponding month of 1912. About 700,000 tons were shipped to the furnaces during December and as the balance on dock Dec. 1 was less this year than for several years past, it is now expected that the docks will be in fairly good shape when the season of navigation opens in spring. It is estimated that the wastage of ore tonnage caused by the elements during 1913 amounted to about 93,000 tons per trip. This will be partly made up by the construction of new tonnage, but the capacity of the available fleet at the opening of navigation will be about 50,000 tons less per trip than it was upon the opening of navigation in 1913.

Pig Iron

Inquiries and actual business done in the Cleveland district during the past week have been in larger volume than in any week for many months. Some very low prices have been made, particularly on a round tonnage of basic sold to the Andrews Steel Co. by Corrigan, McKinney & Co., which went at about $12, furnace, but, on the other hand, a good volume of business has been done on No. 2 foundry at $13. In one case at least, a sale at this price was made for delivery at Pittsburgh, making the delivered price $14.40. Inquiries for foundry iron are coming from all parts of northern Ohio, as well as from more distant points. The United Steel Co. is in the market for 3,500 tons of basic for February delivery and 3,500 for March. The American Steel Foundries is inquiring for from 6,000 to 10,000 tons of basic for delivery during the next six months at Alliance.

Present plans indicate that there will be a sharp reduction in pig iron production this month. The Columbus Iron & Steel Co. blew out one furnace on the last day of the old year, the Cleveland Furnace Co. will blow out a stack on Saturday, one Hubbard stack will go out about Jan. 10 and a lake furnace is expected to blow out about Feb. 1.

Coke

The threat made by Corrigan, McKinney & Co. to blow out all of their stacks has caused much merriment among coke producers, all of whom consider it a bluff. The ludicrous attempt to beat the coke market failed. While $2 has recently been shaded on large tonnages of furnace coke, the market is now apparently firm at $2. There are, however, a number of companies which have sold very small tonnages for first half delivery.

Finished Materials

There is a great deal more activity in contracting for finished materials, particularly steel bars, and recent contracts for steel bars taken by prominent manufacturers amount to fully 25,000 tons for first and second quarter delivery. The leading interest is asking 1.20c, Pittsburgh, for prompt delivery, 1.25c for first quarter and 1.30c for second quarter. Some of the independent companies are fully as firm in their price ideas as is the Steel Corporation, but some contracts have been made, at least for the first quarter, at 1.20c. Protection has been given by steel makers on several structural jobs aggregating a fair tonnage. The American Bridge Co. is preparing to erect the new Hotel Statler, in Detroit, which will require 5,500 tons. The company does not often erect buildings of this kind. The sheet trade is enjoying a general increase in demand and some sheet makers are refusing to make the low quotations which have recently prevailed. The general policy of the mills is to contract in a very conservative way on all finished products.

Old Material

The past week saw a continuance of the deadlock existing in the Cleveland scrap market. Consumers refuse to offer more than the regularly quoted prices, while dealers are holding out for a higher figure. A slightly better sentiment was evident during the closing days of the year, but the future of the scrap market is not well defined and there is a possibility of still lower prices before the end of the month. There is no change in the market quotations.

MARKED IMPROVEMENT

In St. Louis Territory, With Heavier Sales and Firmer Prices.

BY E. C. ERWIN

Office of THE IRON TRADE REVIEW,
St. Louis, Jan. 6.

Sales within the last 10 days and inquiries now in the market have caused a feeling of real optimism to pervade the St. Louis territory relative to the iron industries.

One sales agent reports purchases of 10,000 tons of pig iron within the last 10 days, consisting of eight orders, and nearly all sold for $11, Birmingham basis, for southern No. 2, although a small quantity was disposed of at $10.75 because of a freight differential. Inquiries are in the market today for 300 tons of northern iron, 1,000 tons of southern No. 2, all for delivery at St. Louis; 600 tons of northern, 700 tons of northern and 400 tons of southern No. 2, all for delivery in Burlington, Ia. Local agents, confident that very few of their customers have any large stocks of iron on hand, look forward to some good business soon. Southern No. 2 is reported strong at $11, Birmingham, but now and then one hears that $10.75 could be done.

Prices of scrap iron have not changed within the week, and dealers are confident that some large tonnages are on the verge of changing hands.

The National Brake & Electric Co., Milwaukee, advises it has organized the National Steel Foundries to have charge of the sales of its steel foundries. The general office will be in Milwaukee, and its sales office at 811 Railway Exchange building, Chicago. An addition to the steel foundry is being completed, doubling its output. Equipment is being installed to produce open-hearth steel castings.

Round Tonnage of Basic at Low Price

Purchased by Andrews Steel Co.—Inquiry for Pig Iron Improves at Cincinnati, But Buying is Not Heavy

BY S. G. BACKMAN

Office of THE IRON TRADE REVIEW,
503 Mercantile Library Bldg.,
Cincinnati, Jan. 6.

Pig Iron

The Andrews Steel Co., Newport, Ky., has purchased from 15,000 to 20,000 tons of basic iron for first half requirements. It is understood that none of this business went to southern Ohio or Columbus furnaces, as the price at which it was taken was below the minimum quoted by any of these stacks. It is generally believed by the trade here that part of it went to Cleveland stacks and part to a Birmingham producer, although a great amount of secrecy is being maintained by all involved in this transaction. It is also understood that the price paid was not above $13.85, Cincinnati, if northern iron was purchased, or if southern iron was involved it was probably taken at a lower figure.

The general inquiry has been better during the past few days than for several months, but buying has shown very little improvement. This indicates that a number of melters who have not covered for first half requirements are feeling the market and may cover at any time. Dealers are more optimistic and prices are beginning to show a little strength proportionately.

Minimum quotations on southern No. 2 foundry iron are now generally given at $10.75, Birmingham basis, for first half shipment, but because of the lack of transactions it could not be said that $10.50, Birmingham basis iron has entirely disappeared. The majority of the larger producers are holding firmly at $11, Birmingham basis, for either prompt or first half shipment. Southern Ohio No. 2 foundry iron is unchanged at $13, Ironton, for any delivery up until next July.

Inquiries here include 1,500 tons of analysis iron from the L. Schreiber & Sons Co., this city, 1,200 tons of analysis iron from Mansfield, O., 2,000 tons northern or southern foundry iron from the Lima Locomotive Corporation, Lima, O., 1,000 to 2,000 tons southern No. 2 foundry from a Michigan melter, 500 tons of northern and southern analysis iron from central Indiana, 1,500 tons of southern foundry iron from Louisville, Ky., 2,000 tons of southern and northern foundry iron from northwestern Ohio, and 600 tons of southern No. 3 foundry from a local melter. The Platt Iron Works, Dayton, O., has notified the market that it will buy for first half requirements, but has not specified any tonnage. The Standard Sanitary Mfg. Co. has purchased about 1,500 tons of southern iron for its Louisville, Ky., plant, and is inquiring for an additional small tonnage.

Coke

Prices on Connellsville furnace coke are a little stronger than they were last week, as quite a tonnage of this grade has been sold recently. Foundry coke is unchanged in any of the districts, as there has been but very little demand for it for several months. The Wise County, Pocahontas and New River districts are a little stronger than the Connellsville district in prices on furnace coke. Foundry coke from the Connellsville, Wise County and Pocahontas fields is the same in regard to minimum prices. Both foundry and furnace coke from the New River district are being held at a premium, as practically all of this has been contracted for. The market has been very quiet during the past week following the rather heavy buying movement the last of December, when about 100,000 tons of furnace coke were contracted for by southern Ohio furnaces. It is generally reported from all of the fields that ovens are constantly being put out and this is especially true in the Connellsville district.

Finished Materials

Warehouse quotations on boiler cone head rivets are now given at $2.40 per 100 pounds and structural round head rivets at $2.30 per 100 pounds, which prices are a decline of 10 cents per 100 pounds over last week's prices. Warehouse business has not improved since Jan. 1 and the market is very quiet, but dealers generally express themselves as being confident that January business will exceed that done in November or December, 1913. A lot of steel bars was sold the first of the week at 1.75c and iron bars are being generally held at 1.70c. Cold rolled shafting is somewhat weak and 58 per cent off is becoming the general quotation. All other warehouse prices are unchanged.

The local sheet mill has reduced its price on black and galvanized sheets, No. 28 gage, the former being now quoted at from 2c to 2.05c and the latter at from 3c to 3.05c, f. o. b. Newport, Ky., and Cincinnati. There is a better feeling in the market and specifications are fair.

Old Material

A slightly better demand for No. 1 machine cast has developed within the past few days, which can be attributed to the fact that foundries in this territory are beginning to operate again after the holiday shutdowns for inventory. Prices on this grade are generally given at from $9.50 to $10 per net ton, but slight fluctuations are sometimes reported. The market as a whole does not show any improvement and is very quiet and dull with prices accordingly weak. A decided uncertainty also exists as to any general level of quotations, as prices are practically being made for every particular transaction.

Larger Volume of Business in the South

Increase in Tonnage Placed and in Inquiry—Prices Firm—Furnace Operators More Hopeful

Office of THE IRON TRADE REVIEW,
Birmingham, Ala., Jan. 6.

The pig iron market, since the beginning of the new year, has taken on renewed activity and inquiries have increased very materially. As a result of the trading, the volume of business entered upon furnace order books shows a decided increase. The price remains firm at $11 to $11.50 per ton, No. 2 foundry basis, f. o. b. Birmingham. The aggregate tonnage entered for the week amounts to 15,250. Of this, 2,000 tons were basic for export to Mediterranean ports, while 500 tons of special analysis iron in small lots at the usual premium over the No. 2 foundry were entered for prompt delivery in southern territory. The remaining 12,750 tons consisted of three lots of 1,000 tons each; some 4,000 tons in lots of 500 tons, and 5,750 tons in quantities ranging from 25 to 250 tons. On all of the tonnage entered, strictly first quarter delivery was specified. An additional tonnage of 8,500 was pending, and very probably entered. The

furnace interests feel more hopeful, and expect a demand that will warrant the advancement of the present low level of prices to the point of a better profit return. No increase in production has been begun at this time, and it is very probable that no new operations will begin before Feb. 1, although such repairs as are necessary are being rushed to completion in order that there may be no delay when the demand justifies an increase.

The Woodward Iron Co., Woodward, Ala., has contracted for the construction of 40 ovens of the Koppers type at its by-product plant at Woodward. This will give it 270 ovens of this type, and will greatly increase the supply of merchant coke in the district. Construction of the new ovens is to begin at once.

Cast Iron Pipe

Most of the plants engaged in this line of manufacture are scheduled to resume operation within the coming week, while several plants have already commenced work. Two orders, involving 530 tons, were placed during the week, and several concerns are reported to be well supplied with orders, but from the very best information obtainable conditions are still below normal and very unsatisfactory. The reports of the proposed erection of plants at Gadsden and Bessemer, Ala., are not sufficiently authentic as to be announced as probable.

Old Material

The market for scrap does not seem to respond with the increased demand for pig iron, and very little trading is being done. The transactions are almost entirely for bargain lots, and the movement is still confined to contract tonnages. The stocks on the yards are about normal, and dealers are not showing very much disposition to increase them just now. Heavy machinery scrap seems to be most active of all, and a small amount was sold during the past week, while there was practically no demand for borings and stove plate.

Large Volume of New Business in East

Pig Iron Melters Anxious to Cover at Present Low Prices—Increasing Tonnages of Plates Being Entered

BY C. J. STARK

Office of THE IRON TRADE REVIEW,
326 Real Estate Trust Bldg.,
Philadelphia, Jan. 6.

New business offered in eastern districts in pig iron and in some finished steel products has been of unexpectedly large volume, considering the holiday week and the previously limited trading. Some fresh encouragement that a substantial change for the better is approaching is being derived from this development. With some exceptions, sentiment remains distinctly more hopeful. Prices, however, are the source of much dissatisfaction and in pig iron especially the market apparently has dropped below the cost level of all except a few most favored producers. Finished steel prices reflect more stability.

Pig Iron

For a holiday period the past week has shown unexpected briskness in the eastern Pennsylvania iron market. A distinct broadening in the volume of both sales and inquiries has appeared, largely in foundry and forge grades. Buyers more generally show a disposition to cover as far ahead as the makers will accommodate them and the latter, owing to the low stage of prices, are moving cautiously in this respect. A noteworthy development is the augmented number of small consumers who are now out for metal. Prices still hang at perilously low points and in some cases show slight regard for costs. For northern No. 2X, $14.75 to $15, Philadelphia, represents the going spread. Virginia No. 2X is at $12.75 to $13, furnace. The very low prices on Buffalo iron continue to make this metal a competitive factor of considerable importance in this district. Pipe forge has sold around $14, delivered along the Delaware river, and some makers report they can shade this figure. The Standard Cast Iron Pipe & Foundry Co. has purchased 4,000 tons of forge and No. 3 for early delivery at an average of about $14.25, delivered. The United States Cast Iron Pipe & Foundry Co. in the week bought 3,000 tons or more of northern iron for delivery in this territory, and would take a round tonnage at a satisfactory price. The Glamorgan Pipe & Foundry Co., Lynchburg, Va., distributed 4,500 tons of low grade iron among Virginia makers at a shade below $13, delivered. The Lynchburg Foundry Co. recently bought 2,000 tons of Virginia iron in addition to 3,000 tons of southern, previously reported. The General Electric Co. asks about 5,000 tons of foundry and low phosphorus for various plants. A Trenton consumer is inquiring for 1,500 tons of Nos. 1X and 2X for first quarter. After the recent buying, basic remained quiet. This grade is quoted $14 to $14.25, delivered, $14 having been done with one maker by a central Pennsylvania buyer, as previously reported. A slightly higher price, it develops, was obtained by the second seller in the same transaction. It is now reliably stated that the recent purchases of basic by a Coatesville steel maker reached approximately 25,000 tons. Standard low phosphorus continues to sell at $21 to $21.50, Philadelphia, but 0.05 iron has gone at $20.25. Several thousand tons of Lebanon low phosphorus have sold at $18, furnace. The market in this grade has been quite active. Some curtailment of production of low phosphorus is a possibility of the near future.

Iron and Steel Bars

The Chesapeake & Ohio railroad is inquiring for 1,500 tons of steel bars for first quarter or 3,000 tons for first half. Makers report better specifications and have made some contracts for first half at 1.25c, Pittsburgh, with the provision that specifications are at 1.20c as long as the current market remains at that figure. With most makers, 1.25c is the contract price, though it is indicated some buyers can get 1.20c through first quarter. Bar iron remains weak, a sale at 1.15c, mill, being noted. The spread of the market is about 1.22½c to 1.27½c, Philadelphia. Bar iron from store is quoted at 1.70c, Philadelphia.

Plates

Eastern makers continue to enter a better tonnage for early rolling and are making further contracts for first quarter at 1.25c, Pittsburgh, or 1.40c, Philadelphia. Early rolling orders have been quite brisk the past week, one mill entering 5,000 to 6,000 tons, including one lot of 1,200 tons from tank, boiler and bridge builders. For early delivery 1.20c, Pittsburgh, or 1.35c, Philadelphia, is being done, and in some cases eastern makers are understood to have gone to 1.15c, Pittsburgh, or 1.30c, Philadelphia, which nets, however, a shade under 1.25c, mill. A lot of 6,000 tons for another New York subway section is before makers and a ship yard asks 500 tons. The Southern Aluminum Co. has awarded a riveted pipe line at Whitney, N. C., to the Walsh-Holyoke Boil-

er Works, Holyoke, Mass., to require 2,500 tons.

Structural Shapes

Buyers have offered forward tonnage to eastern shape makers at 1.15c, Pittsburgh, or 1.30c, Philadelphia, but, as far as known, these have been refused. It is not unlikely, however, that a very attractive specification for early shipment could develop such a price. For forward delivery, makers want from 1.20c to 1.25c, Pittsburgh. New business remains small and mill operations are not over 50 per cent.

Wrought Pipe

The American Gas Co., Philadelphia, has placed 2,500 tons of standard steel pipe with the National Tube Co.

Sheets

Six of the seven active sheet mills at Conshohocken have resumed operations after two weeks' idleness. Buyers of sheets are contracting more freely and current orders are better. The minimum price of the eastern market is 1.40c, Pittsburgh, or 1.55c, Philadelphia, for No. 10 gage blue annealed, and some of the shrewdest buyers have closed at this figure. In some cases 1.45c, Pittsburgh, has been obtained.

Semi-Finished Steel

The steel works and billet mills of the Alan Wood Iron & Steel Co., which have been down for two weeks, are still idle and the date of their resumption is indefinite. Little new billet business is in the market. A Chester buyer is understood to have closed against his inquiry for 2,500 tons of special forging billets. Prices remain at about $21.50 to $22.50, delivered eastern Pennsylvania, the inside figure being due to eastern makers absorbing part of the $2.40, Pittsburgh, price in some cases.

Old Material

The inactivity of the holiday period still leaves the scrap market in a helpless state. There is little or no demand for heavy steel as some steel works are still idle, though most of them resumed the past week. Heavy steel remains quoted at $10, delivered. Small sales of turnings and No. 1 forge have been made at higher prices, $7, delivered, in the former grade, and $8, delivered, in the latter.

Buffalo Sales at Very Low Prices

Aggressive Policy Brings Out Considerable Business at Distant Points—Improvement in Finished Materials

BY FRANK R. DOLBEE

Office of THE IRON TRADE REVIEW,
Buffalo, Jan. 6.

The week's orders amounted to fully 40,000 tons of all grades of pig iron, and much of it at low prices for delivery at distant points. The price cutting was an aggressive step on the part of furnacemen to bring out orders. This attitude was met by the melters coming forward for their future needs, but it is said by the producers that prices obtainable a week ago have been withdrawn. All the interests in the district report an increasing interest on the part of the foundrymen. There has been a noticeable increase in inquiry within the past two or three days. Consumption is still at a low level, although the volume of buying has materially increased. The melters all give expression to a better sentiment and report the development of an improvement in orders. The spirit of business as a whole has apparently turned from uncertainty to a tone of optimism since the enactment of the currency law by congress.

Furnace "X", of the Wickwire Steel Co., Tonawanda, has been blown out for repairs. The company has not decided just when it will go into commission again.

The price range at this time is but nominal, from $13 on No. 1 foundry down to $12 on gray forge. This level is said to be lower than has been reached at any time in the past 15 years. At that time coke, ore and labor costs were such that the furnaces could better afford to quote so low a price, than they can at this time.

Finished Material

In every department of the mill trade, a better feeling is reported. The producers are booking moderate tonnages for prompt shipment. These are coming in in larger numbers and for most of the stock sizes of bars and shapes. Practically the only business being considered by the mills is for nearby delivery, where present prices govern. Offers of tonnages for delivery beyond first quarter are being turned down by the mills. Users are showing a disposition to contract but the attitude of the mills on the price question has had a tendency to retard temporarily the return of a buying movement.

The price bottom has apparently been reached at 1.20c, base, on bars, shapes and plates. An improved interest has developed in cold rolled shafting and considerable booking has been done at the current discount of 63 per cent off. Increased trading in black and galvanized sheets has been done since the opening of the new year. There has been a fair amount of sales made and more inquiry noted. In tin plate specifications are more numerous and the mills say they are filling up rapidly. There is an improvement noted in the wire market, with an improved demand and a few more sales at current prices, together with freer specifying.

Fabricators of the district say the outlook is good for a considerable volume of business, although at this time of the year their operations are somewhat slackened and little new business develops. All, however, are optimistic for the future and feel that the turn in conditions has taken place.

The Lackawanna Bridge Co., Buffalo, secured from the Pennsylvania Railroad Co. contracts for two bridges requiring about 300 tons in all.

The George Kellogg Structural Co., Buffalo, is low bidder on the structural for the new South Side high school, Buffalo, taking in all about 1,000 tons, some of which is Bethlehem shapes.

Old Material

Heavy melting steel, borings and turnings, and a number of other commodities in the scrap list developed a degree of activity during the past week to indicate that the market is gaining on the increased demand noted a week ago. There is an increase in the number of inquiries coming in and the tendency of prices is to become much firmer. Instances are reported where users have placed a number of orders at figures slightly in advance of the quoted schedules. This has occasioned the scrap yards to hold off for the improvement in prices apparently due to take place within a short time, as the result of the change in the sentiment of the trade. So far, prices are nominally the same as those quoted a week ago. At the same time, the hold-off attitude of the yards has temporarily minimized the volume of trading.

Hope Engineering & Supply Co., Pittsburgh, advises a report it was to build a machine shop at Mt. Vernon, O., is without foundation.

Price Cutting Develops Pig Iron Buying

Among Eastern Melters—Buffalo Furnaces Invade Unusual Territories—More Activity in Cast Iron Pipe and Other Finished Materials

BY C. J. STARK

Office of THE IRON TRADE REVIEW,
503-4 West St. Bldg.,
New York, Jan. 6.

When American industries for trans-Atlantic and Cuban ores again appear on the market, they are not likely to meet with low-price responses so far as best qualities are concerned, as Europe is absorbing such material at relatively high figures. For instance, an important tonnage of a 60 per cent North African lumpy hematite ore controlled in Philadelphia, has just been sold to steel works in England at better than 8c a unit, f. o. b. cars Philadelphia, and Russian 60 per cent objectionably fine hematite ore recently was sold at the equivalent of 8c per unit, f. o. b. Rotterdam. There is a complete suspension of interest among buyers in the eastern ore market and shipments now are at a much slower pace.

Pig Iron

Activity among consumers, either in closing or inquiring for iron is gradually spreading and a fair volume of trade is now under way. Pending inquiry in this district runs from 15,000 to 20,000 tons, but not all of this is of a formal character and much of it has been brought out by the enticing prices held before buyers by certain makers. Sales continue better, though Buffalo furnaces, the aggressive tactics of which dominate the market, in northern Jersey, metropolitan and New England districts, are getting the lion's share of the business. These furnaces are vigorously seeking orders not only in their logical districts, but in far outlying districts, such as Pittsburgh, Philadelphia, Maryland, Virginia and other points. Their prices in normal distributing territory have usually ranged from $12.50 to $13, furnace, or $14.50 to $15, tidewater, for No. 2X, but 25c lower has been done usually where the freight has been unfavorable and lower is rumored. Eastern Pennsylvania makers generally are not willing to meet these figures. The Central Foundry Co. has closed for 6,000 tons of No. 2X, No. 2 plain and No. 3 for first half delivery at Medina, N. Y.; Newark, N. J., and Baltimore, this business going to Buffalo and eastern Pennsylvania makers, on the basis of about $12.75 to $13, Buffalo furnace. The General Electric Co. asks about 5,000 tons of foundry and low phosphorus iron for various eastern plants. A New Haven buyer wants 1,000 tons of No. 2X, and the Norfolk navy yard is out for 700 tons of foundry. An inquiry is pending in this district for 5,000 tons of low phosphorus. A sale of 4,000 tons of southern iron has been made for Genoa, Italy.

Ferro-Alloys

English makers of ferro-manganese today reduced their prices $2 a ton to a basis of $45, seaboard. This, it is believed, was influenced largely by the recent announcement of the Steel Corporation that it proposed to become a regular seller of this alloy. The Steel Corporation is proving to be a vigorous factor in the market, as of total sales of about 4,000 tons, including one round lot reported the past week, most of this went to that producer. Various reports indicate that considerable concessions were made on some of these sales, although in some cases full prices were quoted. The price situation in ferro-manganese the last two weeks has been decidedly mixed.

Plates and Shapes

The Standard Oil Co. has closed for 3,000 to 4,000 tons of plates, which went to an eastern Pennsylvania maker. New business looks better, more tonnage is moving for early delivery and considerable contracting for first quarter is being done. Prices remain at 1.20c to 1.25c, Pittsburgh, and in certain cases for immediate shipment, it is understood the former level has been shaded by some makers. Railroad equipment orders the past two weeks have been light.

There is continued talk of better prospects ahead for structural material in this district, but the immediate situation remains very dull. New building work in New York City, involving steel requirements, is at a low ebb. The mills, as a consequence, are not getting much tonnage from this territory and their operations, particularly in the east, are kept much reduced. The usual range of the market is from 1.20c to 1.25c, Pittsburgh, or 1.35c to 1.40c, New York, but there are indications that an attractive specification for quick shipment might bring out a lower figure.

Iron and Steel Bars

Leading makers usually ask 1.25c, Pittsburgh, or 1.41c, on steel bar contracts for first quarter, but 1.20c can be done under the most favorable conditions. For quick shipment, a desirable specification probably could develop 1.15c, Pittsburgh. There is more action to the market and specifications are improved. Some contracting continues. Bar iron remains sluggish, as low as 1.15c, eastern mill, having recently appeared. The New York market ranges from 1.25c to 1.30c.

Old Material

Hand-to-mouth buying continues to make up the new business in old material. Heavy melting steel has sold in lots of 500 tons at $10, delivered eastern Pennsylvania, which is the full value for this grade. Other material is moving in sales of corresponding size. Some leading eastern consumers are completely out of the market and are making very low offers, but prices generally are so low that they show more stability.

Cast Iron Pipe

A heavy public and private demand is maintained and sales closed the past week or ten days have been the heaviest in some months. The United States Cast Iron Pipe & Foundry Co. has been selling liberally and has booked orders in that period in the eastern district for 15,000 to 20,000 tons, including 3,800 tons of 36-inch for Worcester, Mass.; 6,100 tons of 30-inch for Troy, N. Y.; 6,000 tons of largely 6-inch for the Brooklyn Union Gas Co., and 1,525 tons of 10 and 12-inch for Mount Morris, N. Y. For the larger sizes about $20, foundry, was obtained. Small size pipe of 4 to 8-inch under a heavier demand is strengthening, around $22.50, foundry, being quoted now by some important producers. An active inquiry pending includes 3,800 tons of 36-inch flexible joint pipe for New York state for use on the Catskill aqueduct system, 6,000 tons for the Consolidated Gas Co., Baltimore, 1,800 tons for the International Gas Co., New York City, 6,000 to 7,000 tons for the Chicago Gas Co., and others. The Chicago Gas Co. tonnage is expected to go to the leading maker. Producers of pipe all are much encouraged by the revival of the market.

Foundry Burned.—The entire plant of the Cyclops Foundry Co., Monongahela, Pa., was destroyed by fire, Jan. 2. The company, which operates a general gray iron foundry, had completed plans to extensively improve its works, and much of the new equipment was on railway sidings, ready for installation. Owners have reached no decision concerning future plans.

RAIL DISTRIBUTION

Is Being Made by Several Lines—Ralston Company Orders Steel.

New York, Jan. 7. (By wire.)—The Erie railroad has practically closed for 35,000 tons of rails, the bulk of which is with the Steel Corporation. Three small western lines have placed lots of 7,000, 5,000 and 3,000 tons with the Illinois Steel Co., and the San Francisco Street Railway has closed for 4,000 tons with the Illinois company. The Southern railroad is inquiring for 20,000 tons additional. The Union Pacific is understood to have closed practically on its inquiry for 5,000 cars, part going to the Bettendorf company. The Clover Leaf has given 5,000 to Haskell & Barker. The Hocking Valley is understood to have closed for 1,000 coal cars with Cambria Steel Co. Chesapeake & Ohio expected to close for 2,000 additional cars this week.

While formal orders have not yet been distributed, the New York Central System practically closed with makers for about half its rail requirements for 1914 for early rolling and has reserved space for the remainder. According to the orders substantially closed, it is indicated that the total requirements of this system for 1914 will be about 140,000 tons. As usual, the Lackawanna Steel Co. and the Steel Corporation mills received the largest portion of the tonnage.

The Delaware, Lackawanna & Western railroad now has practically closed for 15,000 tons of rails previously referred to, the division being between the Lackawanna, Bethlehem and Pennsylvania Steel companies. The Lehigh & New England railroad has ordered 4,000 tons of open-hearth rails from the Bethlehem Steel Co. The Norfolk & Western railroad has awarded 5,000 kegs of spikes to the Republic Iron & Steel Co. The spike requirements of the Seaboard Air Line recently inquired for will go to the Virginia maker.

Bridge work is quite small. Two additional subway and elevated sections in New York City, under bid, call for about 18,000 tons. The American Bridge Co. has not yet received formal awards for 50,000 tons for three sections closed some time ago, but these eventually will go to this fabricator. A section requiring 17,000 tons, for which the Oscar Daniels Co. has the general contract, is still in doubt. The Carnegie Steel Co. has been awarded 10,000 tons of car material by the Ralston Steel Car Co.

Bridge and Structural Work.

Elevated railroad section, Liberty avenue, Brooklyn, for New York Municipal Railways Corporation, 13,500 tons. Phoenix Bridge Co. low bidder.

Section No. 6 of the Seventh avenue subway line, New York City, 4,800 tons; the Rapid Transit Construction Co., a subsidiary of the Interborough Rapid Transit Co., low bidder.

Chicago & Western Indiana R. R. Co., track elevation bridges, Chicago, 400 tons, to the American Bridge Co.

Three bridges over New York State barge canal, 750 tons, awarded to McClintic-Marshall Co.

Bridge for Pennsylvania railroad at Metuchen, N. J., 200 tons, awarded the McClintic-Marshall Co.

Anderson street station of Pennsylvania railroad, Pittsburgh, 1,400 tons, finally awarded McClintic-Marshall Co.

HORSE SHOE DEALER

Says He Drove Steel Corporation Out of Chattanooga Market.

(Special Correspondence.)

Atlanta, Ga., Jan. 6.—Hearings in the suit of the government to bring about the dissolution of the United States Steel Corporation were held here Monday, before Examiner John A. Brown, of Philadelphia. The government was represented by Henry A. Colton, special assistant to Attorney General McReynolds.

David A. Reed, of Pittsburgh, representing the Steel Corporation, called four witnesses in behalf of the defendant Corporation.

Clyde L. King, of the Atlanta Agricultural Works, testified that competition exists in the sale of steel bars and plates. He said concerns dealing in these lines quoted various prices. He also said the quality and delivery of goods from the Tennessee Coal, Iron & Railroad Co. had improved greatly since that company had been acquired by the Steel Corporation.

George V. Denny, of Savannah, a buyer of wire and pipe, testified there is no monopoly.

J. C. Vance, a dealer in horse shoes, structural bars and steel shapes, testified he had driven the Steel Corporation out of the Chattanooga horse shoe market. He testified the Steel Corporation is not a monopoly.

G. C. Fulford, of Albany, testified other sellers obtained his business because they underpriced the Steel Corporation.

Hearings were held at the Piedmont hotel and another session will be held today. The hearing is to be transferred to Birmingham, Ala., from here.

FEW NEW BUILDINGS

Are Contracted For—Low Prices For Erection in the East.

New York City still is producing a very small tonnage of structural lettings. Other eastern districts remain very quiet. The new subway and elevated extensions still are the principal items of structural interest in the metropolis, but it is reported that some other large projects are maturing. Recent competition for subway work has been more spirited and prices of $48, erected, for elevated construction have been quoted.

Fabricating orders placed in the west last week aggregate 5,106 tons. Of this total, 4,000 tons were included in one item. The year opens with the local fabricators operating at one-half their normal capacity, and the next two months which usually bring the severest winter weather, are expected to be quiet.

Several hundred tons of structural and ornamental steel will be required by Hanke Bros., Cincinnati, O., dealers in dry goods and notions, for their building which will be erected on Main street, near Twelfth street, that city. The building will be 23 x 80 feet, four stories. Bids for the construction will be let within the next month.

Structural Contracts Placed

Building for Empire Life Insurance Co., Augusta, Ga., 800 tons, general contract awarded the Whitney Co., New York City, and fabrication will be done by Levering-Garrigues.

Structural Contracts Pending

Warehouse for Baltimore Bargain House Co., Baltimore, alternate bids on steel and concrete construction submitted and concrete design adopted. Was estimated to have required 3,700 tons of steel.

The Detroit Athletic Club, Detroit, 1,300 tons.

Detroit Electric Illuminating Co., Detroit.

Contracts Placed

Northern Coal & Dock Co., coal handling bridge, Milwaukee, Wis., 365 tons.

Duluth & Iron Range R. R. Co., steel trestle for coal handling towers and coal dock cable cars, Two Harbors, Minn., 365 tons, to the American Bridge Co.

Whitney building, Detroit, 4,500 tons, awarded to Lanquist & Illsley, Chicago.

Armand Alexandre, with offices at Suite 1925-1927 Peoples' Gas building, Chicago, wishes to inform the trade that he has entirely severed his connections with the Ohio Iron & Metal Co. in the First National Bank building, that city.

The plant of the Hanks Foundry Co., Rome Ga., has been removed to new quarters in West Rome, where capacity is increased largely.

Trouble About German Tube Syndicate

General Agreement Reached, But Time Will Be Required to Adjust Details—Will Handle Entire Tube Output

Berlin, Dec. 30.—Considerable satisfaction is expressed in Germany at the formation of the German Tube Syndicate. At the meeting on Dec. 12, a deadlock seemed unavoidable, two Silesian firms stubbornly refusing their consent unless their demands with regard to special treatment were conceded. The other interests considered they had gone as far as possible in meeting these claims, and the next day they presented an ultimatum threatening to break off all negotiations unless the Silesian producers signed the agreement by the following Monday, 6 p. m. This would have meant that free competition, which had been suspended pending a definite decision with regard to the syndicate, would again prevail. As a result of the threat, the Silesian firms were brought into line. Although the broad lines of the new organization are already fixed, it will be some little time before the complete regulations have been drawn up. The constitution of the cartel, whose headquarters are at Dusseldorf, is similar to that of the State Syndicate, the entire output of all melters being disposed of through a central sales bureau. Both the domestic and export markets will be under the control of the syndicate, which will handle the entire tube output of Germany. The agreement is for ten years. The dividend of the Donnersmark Smelting Works, of Upper Silesia, is estimated at 24 per cent. The iron works of Les Petit Fils de Francois de Wendel et Cie., of Hayingen (Lorraine) have raised the basis price for iron bars to 95 marks ($22.32½) per 1,000 kilograms.

Common steel bars are dealt with in the Rhine Westphalian district at 98 to 100 marks ($23.03 to $23.50) per ton, the factories refusing even to take orders for delivery later than March 31 at this price. It is not the same for exportation, which remains a feeble market. German factories are offering bars at 92 to 93 marks ($21.62 to $21.85½) free on board Antwerp.

The pig iron syndicate has announced that it will allow the consumers a rebate of 50 pfennige to 1 mark 50 pfennige per ton (11¾ cents to 35¼ cents) for buyers taking from 1,000 to 10,000 tons per annum. The object of this announcement is to get a considerable number of consumers to come out of their shells who have refrained till the present from giving their usual order. There are other indications that the period for the signing of their annual contracts is within reach, one of which is believed to be the proposed reduction announced which is probably not without a hint from the other side. A point, however, has to be made note of, namely, that the stocks of pig iron are growing and there is a reduction in the dispatch of pig iron and other products controlled by the steel works union.

New President Wheeling Mold & Foundry Co.

H. E. Field, for the last nine years metallurgical engineer for Mackintosh,

H. E. FIELD

Hemphill & Co. and the Seaman-Sleeth Co., both of Pittsburgh, has resigned to become president and general manager of the Wheeling Mold & Foundry Co., Wheeling, W. Va., where he will assume duties Feb. 1. Mr. Field succeeds C. E. Blue, who resigned on account of ill health.

BASIC PURCHASE

Made at $10.50, Birmingham—Inquiry For Low Grade Irons.

New York, Jan. 7. (By wire.)—The Andrews Steel Co. has placed 20,000 tons of basic for first half with two southern makers on a $10.50 basis, but leading southern makers continue to hold for $11 for forward foundry.

The United States Cast Iron Pipe & Foundry Co. has entered the market for 60,000 tons of low grade iron. This buyer, as reported, has been booking new cast iron pipe business very liberally the past few weeks.

IN GOOD VOLUME

Business is Developing With Prices For Forward Delivery Firmer.

Pittsburgh, Jan. 7. (By wire.)—Sentiment continues to improve in the Pittsburgh district. Inquiries are coming out in good volume and there is more snap to specifying than there has been since the middle of last year. Prices appear firmer for forward delivery, although some concessions are being offered for immediate shipment.

There is a better tone in the market for wire products and leading manufacturers feel more cheerful concerning the future. Mills are quoting nails at $1.55 for forward delivery. Prompt material is being obtained at $1 a ton under that figure, which is the lowest to prevail since the latter part of 1911.

The American Bridge Co. has taken 1,100 tons for dams 16 and 17 in the Ohio river, being built by the C. A. Gillespie Co. The Jones & Laughlin Steel Co. has received 500 tons for the Elizabeth Magee Memorial Hospital, Pittsburgh.

H. G. Dalton, of Pickands, Mather & Co., Cleveland, sailed Jan. 3 from New York, accompanied by Mrs. Dalton. They will spend four months in foreign lands, including Egypt.

Samuel Vauclain, vice president of the Baldwin Locomotive Works, is about to sail for South America, where some large orders for locomotives now are pending.

John Williams, president of John Williams, Inc., New York City, and one of the pioneers in this country in artistic metal work, died at his home in that city, Jan. 5, aged 72 years. He began his business career in the employ of Tiffany, New York City, and in 1875 established his own shop. Mr. Williams had executed many important designs in bronze, brass and wrought iron, which included statues, doors of public buildings, public library work, etc.

Millbury Steel Foundry Co., Millbury, Mass., is to be enlarged, according to plans made by directors recently.

IRON AND STEEL PRICES

Pig Iron

PITTSBURGH

(Through First Half 1914.)

Bessemer	$15.15
Basic	13.40 to 13.65
No. 2 foundry	13.65 to 13.90
Malleable	13.90
Gray forge	13.40

(The freight from valley points is 90c.)

CLEVELAND

(Through First Half 1914, Delivered in City.)

No. 1 foundry	$14.00
No. 2 foundry	13.50
No. 2 southern	15.10 to 15.35
Bessemer	15.15

CINCINNATI

(Prompt and First Half.)

Southern foundry No. 1	$14.25 to 14.75
Southern foundry No. 2	13.75 to 14.25
Southern foundry No. 3	13.25 to 13.75
Southern foundry No. 4	13.00 to 13.50
Southern gray forge	12.75 to 13.25
Mottled	12.75 to 13.00
Southern No. 1 soft	14.50 to 15.00
Southern No. 2 soft	14.00 to 14.50
Southern Ohio No. 2	14.20 to 14.70
Southern Ohio No. 3	13.70 to 14.20
Southern Ohio No. 4	13.45 to 13.95
Silveries, 8 per cent silicon	17.70 to 18.20

(Freight from Ironton, $1.20; from Birmingham, $3.25.)

CHICAGO

(Delivered Chicago, until July 1, 1914, except northern foundry and malleable Bessemer, which are quoted f. o. b. local furnace.)

Lake Superior char., No. 1 to 4	$15.50
Northern foundry No. 2	14.25
Southern foundry No. 2	15.35
Jackson Co. silveries, 8 per cent	18.40
South'n silveries, 5 per cent sil.	16.85
Alabama basic	15.35
Malleable	14.25

PHILADELPHIA

(Prompt and first half shipment delivered to consumer's plants in Philadelphia and vicinity, unless otherwise specified.)

Northern No. 1X foundry	$15.25 to 15.50
Northern No. 2X foundry	14.75 to 15.25
Northern No. 2 plain	14.50 to 14.75
Standard forge (Eastern Pa.)	14.00 to 14.25
Virginia No. 2X	15.55 to 15.80
Southern No. 2	15.00 to 15.50
Standard low phos., Phila.	20.75 to 21.50
Lebanon low phos., furnace	17.50 to 18.00
Malleable	15.00 to 15.50
Basic (Eastern and Central Pa.)	14.00 to 14.25
Middlesbrough, English No. 3 (on dock	14.50 to 14.75

NEW YORK

(Prompt and first half delivery, prices based at Jersey City and at Jersey points near tidewater.)

Northern No. 1X foundry	$14.75 to 15.00
Northern No. 2X foundry	14.50 to 14.75
Northern No. 2 plain	14.25 to 14.50
Virginia No. 2X	15.85 to 16.10
Southern No. 2	14.75 to 15.25
Malleable	14.50 to 15.00
Gray forge	14.25 to 14.50

ST. LOUIS

(Throughout This Year.)

Southern No. 1	$15.25 to 15.75
Southern No. 2	14.75 to 15.25
Southern No. 3	14.25 to 14.75
Southern No. 4	13.75 to 14.25

(Freight, Birmingham to St. Louis, $3.75.)

BIRMINGHAM

(For Southern Delivery.)

No. 1 foundry	$11.50 to 12.00
No. 2 foundry	11.00 to 11.50
No. 3 foundry	10.75 to 11.00
No. 4 foundry	10.50 to 10.75
Gray forge	10.50 to 10.75
Mottled	10.25
Standard basic	11.00 to 11.50
Off basic	10.50 to 11.00
Charcoal	25.00

BUFFALO

(Delivered in city first and second quarters.)

No. 1 foundry	$13.00
No. 2X foundry	$12.50 to 13.00
No. 2 plain	12.25 to 12.50
No. 3 foundry	12.00 to 12.25
Gray forge	12.00 to 12.25
Malleable	12.50 to 13.00
Basic	13.00 to 13.50
Charcoal,	15.50 to 16.50

Ferro Alloys

English 80 per cent ferro manganese, prompt and forward delivery, $45, seaboard.

Fifty per cent ferro-silicon, $73, Pittsburgh, or Philadelphia, for carloads; $72 for larger lots, and $71 for 600 tons or more. Twelve to 13 per cent, $23. Eleven to 12 per cent, $22. Ten to 11 per cent, $21. Nine to 10 per cent, $20, f. o. b. Globe, Jisco, and Ashland furnace. Freight to Pittsburgh, $1.90.

Ferro-carbon titanium 8 cents per pound for carload lots; 10 cents per pound for 2,000-pound lots and over; 12½ cents per pound in lots up to 2,000 pounds.

Freight rates on ferro-manganese, foreign spiegeleisen and electrolytic ferro-silicon from Baltimore to Pittsburgh, $2.16; to Youngstown, $2.48; to Cleveland, $2.57; to Detroit and Columbus, $2.99; to Cincinnati, $3.40; to Chicago and Milwaukee, $4.00. Freights from Philadelphia and New York, 10 to 30 cents higher, respectively.

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 pounds, to:—

New York	16 cents
Philadelphia	15 cents
Boston	18 cents
Buffalo	11 cents
Cleveland	10 cents
Cincinnati	15 cents
Chicago	18 cents
Denver	84½ cents
St. Louis	22½ cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast, shapes and plates	80 cents

Coke

AT THE OVENS.

	Prompt shipment.	Contract.
Connellsville district:		
Foundry coke	$2.50 to 2.75	$2.50 to 2.75
Furnace coke	1.80 to 1.90	1.85 to 2.00
Wise county district:—		
Foundry coke	$2.50 to 3.10	$2.65 to 3.10
Furnace coke	2.10 to 2.25	2.10 to 2.25
Pocahontas district:—		
Foundry coke	$2.50 to 3.00	$2.50 to 3.00
Furnace coke	2.00 to 2.40	2.10 to 2.60
New River district:—		
Foundry coke	$2.85 to 3.50	$2.85 to 3.50
Furnace coke	2.50 to 2.75	2.50 to 2.75

Iron Ore

On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51½ per cent on old range and Mesabi non-Bessemer prices are: Old range Bessemer, $4.40; Mesabi Bessemer, $4.15; old range non-Bessemer, $3.60; Mesabi non-Bessemer, $3.40; all at lower lake ports.

Foreign iron ores, 7½ to 8 cents per unit, f. o. b. cars eastern seaboard. Freight rates from Philadelphia to eastern Pennsylvania furnace points range from 35 to 75 cents per ton.

Semi-Finished Material

PITTSBURGH

Bessemer 4 x 4 billets with 0.25 carbon and less, $20.00; open-hearth rolling billets, $20.00; Bessemer sheet bars, $21.00; open-hearth sheet bars, $21.00, f. o. b. makers' mill. Forging billets, $24 to $25, Pittsburgh. Wire rods, $25.50; muck bar $29, Pittsburgh.

PHILADELPHIA

Delivered to consumers' plants in Philadelphia and vicinity: 4 x 4-inch open-hearth and Bessemer, rolling billets at $21.50 to $22.50, and forging billets at from $26.50 to $27.50; muck bar, $28.00 to $30.00.

Standard Shapes

PITTSBURGH

Standard structural shapes, 1.20c to 1.25c. For extras see card of Sept. 1, 1909.

CHICAGO

Standard structural shapes, 15 inch and under, 1.33c to 1.38c.

PHILADELPHIA

Standard structural shapes, base sizes, delivered to consumers' plants in Philadelphia and vicinity, 1.35c to 1.40c.

NEW YORK

Standard structural shapes, base sizes, delivered in metropolitan district, 1.36c to 1.41c.

Plates

PITTSBURGH

Standard steel plates ¼ inch thick, 6¾ to 100 inches, 1.15c to 1.20c. For extras, see card of Sept. 1, 1909.

CHICAGO

Tank plates, 1¼ inches thick, 6⅝ to 100 inches wide, 1.33c to 1.38c.

PHILADELPHIA

Tank plates, base sizes, delivered to consumers' plants in Philadelphia and vicinity, 1.35c to 1.40c.

NEW YORK

Tank plates, base sizes, delivered in the metropolitan district, 1.36c to 1.41c.

Sheets and Tin Plate

PITTSBURGH

No. 28 black	1.85c to 1.90c
No. 28 tin mill black	1.80c to 1.85c
No. 28 galvanized	2.85c to 2.90c
No. 10 blue annealed	1.35c to 1.40c
No. 28 painted corrugated	2.10c to 2.15c
No. 28 galvanized, corrugated	3.00c to 3.05c
Tin plate, 100-pound cokes	$3.40

PHILADELPHIA

Delivered to consumers' plants in Philadelphia and vicinity: No. 10 gage annealed sheets at 1.60c to 1.65c.

Pipe and Boiler Tubes

PITTSBURGH

	Black Butt-Weld.	Galv. Butt-Weld.
Steel, ⅜ to 3 inches	80	71½
Iron, ⅜ to 2½ inches	70	61
	Lap-Weld.	
Steel, 2½ to 4½ inches	79	70½

BOILER TUBES

Steel, 3½ to 4½ inches	69	..
Iron, 3½ to 4½ inches	58	..

Other sizes of pipe and tubes take the usual advances as per official cards.

Rails and Track Material

PITTSBURGH

Steel rails, 50-pound and heavier, 1.25c per pound for Bessemer and 1.35c for open-hearth, carload lots; less than 500 tons, 1.35c per pound; light rails on base weight of 40 to 45 pounds, 1.25c, schedule on the other weights being irregular and subject to negotiations; angle bars for standard sections, 1.50c base, Pittsburgh; track bolts, 2.00c base, Pittsburgh.

Railroad spikes, 4½, 5 and 5½ and 9-16 inch, 1.45c to 1.50c.

CHICAGO

Light rails, carloads 25 to 45-pound, 1.25c; base; 16 to 20-pound, 1.30c; 12-pound, 1.35c; 8-pound, 1.40c.

Light section relayers, 45 pounds and under, subject to inspection, $21.50 to $22.50; standard section relaying rails, subject to inspection, $23 to $24.

Track fastenings, f. o. b. Chicago:

Angle bars, 1.50c; railroad spikes, 1.50c to 1.55c; smaller sizes, spikes, 1.75c base; track bolts with square nuts, 2.10c to 2.20c.

Bars, Hoops and Bands

PITTSBURGH

Common iron bars, 1.30c to 1.35c, Pittsburgh; Bessemer and open-hearth steel bars, 1.20c; plow and cultivator, 1.20c; channels, angles, zees, tees, under 3 inch 1.30c, all f. o. b. mill.

Hoops in carload lots, 1.40c, Pittsburgh; in less than carload lots, 1.45c; bands, 1.20c base, with net extras as per standard steel.

Cold rolled and ground shafting, 63 to 65 per cent off in carloads and 58 per cent in less than carloads delivered in base territory.

CHICAGO

Bar iron, 1.15c to 1.20c; hard steel bars, rerolled, 1.30c; soft steel bars, bands and small shapes, 1.33c to 1.38c; hoops, 1.53c; smooth finished machinery steel, 1 inch and larger, 1.68c; shafting, 65 per cent off list for carload lots, 60 per cent off for less than carloads.

PHILADELPHIA

Delivered in consumers' plants in Philadelphia and vicinity: Steel bars, 1.35c to 1.40c on contract and common bar iron, 1.22½c to 1.27½c. Cut nails, 1.80c to 1.90c, Philadelphia. Shafting, 64 to 65 off in carloads and 62 to 63 off in less than carloads in base territory.

NEW YORK

Soft steel bars delivered in the metropolitan district, 1.36c to 1.41c; common iron bars, 1.25c to 1.30c.

Bolts, Nuts and Rivets

Rivets

Button head structural rivets, 1.60c to 1.65c, Pittsburgh; cone head boiler rivets, 1.70c to 1.75c. Small rivets, 80 and 10.

Structural rivets, Chicago, 1.83c; boiler rivets, 0.10c extra.

Bolt and Nut Discounts

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, small and shorter, rolled threads, 80 and 2½; cut threads, 75 and 17½; larger and longer, 70, and 15.

Machine bolts with hot pressed nuts, ⅜ x 4 inches, smaller and shorter, rolled 80 and 7½; cut, 80 and 2½; larger and longer, 70, 10 and 10.

Gimlet and cone point lag or coach screws, 80 and 20.

Hot pressed square, blank or tapped nuts, $6.00 off list; hot pressed hexagon blank or tapped, $6.70.

Cold pressed C. & T. square, blank, or tapped, $3.80 off; hexagon, blank or tapped, ⅝ inch and larger, $6.80 off; ½-inch and smaller, $7.40.

Wire Products

PITTSBURGH

Wire nails, jobbers' carload lots, $1.55; retailers' carload lots, $1.60; cut nails (western makers) jobbers' lots, $1.60; painted barb wire, jobbers' carload lots, $1.55; retailers' carload lots, $1.60; plain wire to jobbers in carloads, $1.35; and to dealers in carloads, $1.40; polished staples, $1.55; galvanized staples, $1.95.

CHICAGO

Wire nails, jobbers' carload lots, $1.73; retailers' carload lots, $1.78; retailers' less than carload lots, $1.83; painted barb wire, jobbers' carload lots, $1.73; retailers' carload lots, $1.78; retailers' less than carload lots, $1.83, with 40c for galvanizing; plain wire, jobbers' carload lots, $1.53; retailers' carload lots, $1.58.

Cast Iron Pipe

CHICAGO

Four-inch water pipe, $26.50; 6 to 12 inches, $25.00; larger sizes, $23.50; gas pipe, $1 a ton higher.

NEW YORK

Six-inch pipe, 30 pounds to the foot, $22.00 to $23.00, f. o. b. New York, in carload lots.

BIRMINGHAM

Water mains, 4-inch, $22.50; 6-inch and up, $19.50. Gas main: $1 per ton higher than water main. Special fittings, $47.50 to $52.50.

Old Material

PITTSBURGH

(Gross Tons Delivered.)

Heavy melting scrap	$11.00 to 11.25
Rerolling rails	13.50 to 14.00
Malleable	10.50 to 10.75
Bundled sheet scrap	6.25 to 6.75
Iron axles	22.00 to 23.00
Old iron rails	13.00 to 13.50
Stove plate	9.00 to 9.50
No. 1 wrought scrap	11.50 to 12.00
Old car wheels	11.00 to 11.50
Low phosphorus	14.25 to 14.50
Machine shop turnings	6.75 to 7.00
No. 1 busheling	9.00 to 9.50
Cast borings	7.75 to 8.00
No. 1 cast scrap	11.50 to 12.00

PHILADELPHIA

Gross tons delivered to consumers' plants, in eastern Pennsylvania and western New Jersey:

Old iron rails (nominal)	$15.50 to 16.00
Old steel rails (rerolling)	12.00 to 12.50
No. 1 heavy melting steel	10.00 to 10.25
Old car wheels	12.00 to 12.50
Old iron axles (nominal)	20.00 to 21.00
Old steel axles	15.75 to 16.25
No. 1 railroad wrought	12.75 to 13.00
Wrought pipe	8.75 to 9.25
Cast borings	7.75 to 8.00
Machine shop turnings	7.00 to 7.25
Heavy cast (broken)	12.00 to 12.50
Malleable	9.00 to 9.50
Stove plate	9.00 to 9.50
No. 1 forge	8.00 to 8.25
Low phosphorus	14.00 to 14.50

Freight rates per ton on scrap from Philadelphia to principal eastern consuming points are: $0.60 to Ivy Rock, Pa.; $0.65 to Phoenixville, Pa.; $0.80 to Coatesville, Pa.; $0.85 to Bethlehem, Pa., Reading, Pa., and Roebling, N. J.; $1.10 to Pottsville, Pa., Lebanon, Pa., and Columbia, Pa.; $1.20 to Harrisburg, and Steelton, Pa.; $1.40 to Milton, Pa.

CLEVELAND

Gross Tons

Old iron rails	$12.50
Old steel rails (under 3 ft.)	12.00 to 12.50
Old steel rails (over 6 ft.)	11.25 to 11.75
Relaying rails	23.00 to 25.00
Old steel boiler plate	8.00 to 8.50
Malleable iron (railroad)	10.50 to 11.00
Axle turnings	6.00 to 6.50
Steel axles	16.00 to 16.50
Malleable iron (agricultural)	8.00 to 8.50
Heavy steel	9.25 to 9.75
Country mixed steel	8.00 to 8.50
Bundled sheet scrap	6.50 to 7.00

Net Tons

No. 1 R. R. wrought	$9.50 to 10.00
No. 1 busheling (new)	8.00 to 8.50
No. 1 busheling (old)	7.75 to 8.00
No. 1 machine cast	10.50 to 11.00
No. 1 dealers' wrought	8.00 to 8.50
Machine shop turnings	4.00 to 4.50
Pipes and flues	7.00 to 7.50
Wrought drillings	4.00 to 4.50
Cast borings	5.00 to 5.50
Stove plate	8.00 to 8.25
Wrought iron arch bars (nom.)	13.00
Wrought iron piling plate (nom.)	13.00

CHICAGO

(Delivered in consumers' yards.)

Gross Tons

Old car wheels	$11.25 to 11.75
Rerolling rails (5 ft. and over)	11.00 to 11.50
Old steel rails (3 ft. and und.)	10.00 to 10.50
Frogs, switches and guards	9.00 to 9.50
Heavy melting steel	9.00 to 9.50
Shoveling steel	8.00 to 8.50

Net Tons

No. 1 R. R. wrought	$ 8.50 to 9.00
No. 2 R. R. wrought	7.50 to 8.00
Arch bars and transoms	12.00 to 12.50
Knuckles, couplers and springs	9.00 to 9.50
Shafting	11.50 to 12.00
Iron car axles	17.00 to 17.50
Steel car axles	11.75 to 12.25
Locomotive tires	10.50 to 11.00
Cut forge	7.50 to 8.00
Pipe and flues	6.25 to 6.75
No. 1 cast	10.00 to 10.50
No. 1 busheling	7.00 to 7.50
No. 2 busheling	5.50 to 6.00
No. 1 boiler cut	7.00 to 7.50
Boiler punchings	9.50 to 10.00
Cast borings	3.75 to 4.25
Machine shop turnings	4.00 to 4.50
Agricultural malleable	8.50 to 9.00
Railroad malleable	9.00 to 9.50
Angle bars, splices, etc., iron	11.75 to 12.25
Angle bars, steel	7.50 to 8.00
Stove plate and light cast scrap	8.75 to 9.25

NEW YORK

Gross tons, New York dealers' prices at tidewater, usually for eastern Pennsylvania delivery:

Old car wheels (nominal)	$10.00 to 10.50
Heavy steel axles	14.00 to 14.50
Steel shafting (nominal)	12.00 to 12.50
No. 1 heavy melting steel	7.25 to 7.50
No. 1 R. R. wrought	10.75 to 11.00
Wrought pipe (not galvanized)	6.50 to 6.75
Clean cast borings	5.00 to 5.50
Machine shop turnings (nominal)	4.50 to 4.75
Heavy cast	9.50 to 10.00

Stove plate	6.75 to 7.00
Grate bars	6.50 to 6.75

Freight rates on scrap per ton to Steelton, Pa., Columbia, Pa., Pottsville, Pa., and Harrisburg, Pa., are $1.50 from Jersey City, and $2.00 from New York; to Coatesville, Pa., Ivy Rock, Pa., Phoenixville, Pa., and Reading, Pa., $1.50 from Jersey City, and $1.80 from New York; to Bethlehem, Pa., $1.10 from Jersey City, and $1.60 from New York; to Roebling, N. J., $1.10 from Jersey City, and $1.50 from New York; to Milton, Pa., $1.60 from Jersey City, and $2.00 from New York; to Jersey City, $1.00 from New York; to Newark, N. J., $1.10 from New York.

CINCINNATI

Gross Tons

Old iron rails	$10.50 to 11.50
Old steel rerolling	9.50 to 10.00
Old iron axles	15.50 to 16.00
Heavy melting scrap	8.50 to 9.00
Relaying rails	18.50 to 19.00

Net Tons

Old No. 1 R. R. wrought	$ 8.25 to 8.75
Bundled sheet scrap	4.50 to 5.00
No. 1 yard wrought	6.50 to 7.00
No. 1 machine cast	9.50 to 10.00
No. 1 busheling	6.00 to 6.50
Stove plate	6.75 to 7.25
Machine shop turnings	4.00 to 4.50
Cast borings	4.00 to 5.00
Heavy turnings	5.00 to 5.50
Mixed cast	7.50 to 8.00
Breakage	5.00 to 6.00
Malleable	6.50 to 7.00

BIRMINGHAM

Old iron axles (light)	$15.00 to 15.50
Old steel axles (light)	15.00 to 15.50
Old iron rails	12.50 to 13.50
No. 1 R. R. wrought	12.00 to 12.50
No. 2 R. R. wrought	10.00 to 10.50
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Standard car wheels	12.00 to 12.50
Tram car wheels	10.50 to 11.00
Light cast and stove plate	8.00 to 8.25

BUFFALO

Gross Tons

Heavy melting steel	$ 9.75 to 10.50
No. 1 R. R. and mch. cast scrap	12.00 to 12.50
No. 1 R. R. wrought scrap	12.00 to 12.50
Old steel axles	17.00 to 17.50
Old iron axles	22.50 to 23.00
Car wheels	10.75 to 11.25
Railroad malleable scrap	10.50 to 11.50
Machine turnings	5.00 to 5.50
Heavy axle turnings	8.00 to 8.75
Cast iron borings	5.50 to 6.00
Low phos. steel scrap	15.00 to 15.75
Old iron rails	15.00 to 15.50
Boiler plate sheared	11.50 to 12.00
Bundled sheet scrap	6.00 to 6.50
Stove plate (net ton)	9.75 to 10.00
Locomotive grate bars	9.50 to 10.00
No. 1 busheling scrap	8.50 to 9.00
No. 2 busheling scrap	6.00 to 6.50
Wrought pipe	8.50 to 9.00

ST. LOUIS

(Dealers' buying prices.)

Gross Tons

Old car wheels	$10.25 to 10.75
Old iron rails	11.00 to 11.50
Re-rolling rails (5 ft. and over)	10.50 to 11.00
Old steel rails (3 ft. and und.)	9.00 to 9.50
Light sec. relayers (45 pounds and und.) subject to inspec.	23.00 to 23.50
Relaying rails, subject to inspec.	23.00 to 23.50
Frogs, switches and guards	8.50 to 9.00
Shoveling steel	8.00 to 8.50

Net Tons

No. 1 railroad wrought	$7.00 to 7.50
No. 2 railroad wrought	6.50 to 7.00
Arch bars and transoms	11.00 to 11.50
Knuckles, couplers, springs	8.00 to 8.50
Shafting	12.50 to 13.00
Steel car axles	11.00 to 11.50
Iron car axles	13.50 to 14.50
Locomotive tires	9.00 to 9.50
Pipe and flues	5.00 to 5.50
Tank iron and cut boilers	5.00 to 5.50
No. 1 cut busheling	7.00 to 7.50
Cast iron borings	2.00 to 2.50
Machine shop turnings	3.00 to 3.50
Railroad malleable	6.50 to 7.00
Agricultural malleable	5.00 to 5.50
Stove plates	6.50 to 7.00
Angle splice bars (iron)	9.00 to 9.50
Angle splice bars (steel	7.00 to 7.50

Store Prices

CINCINNATI

Steel bars, 1.75c to 1.90c; iron bars, 1.70c to 1.80c; plates and shapes, 1.85c to 2c; sheets, blue annealed, No. 10, 2.05c to 2.10c; black No. 28, 2.55c; galvanized, No. 28, 3.65c; cold rolled shafting, round, square, hexagon and flat, 55 to 58 off.

CLEVELAND

Steel bars, 1.80c; plates and shapes, 1.90c; iron bars, 1.85c; sheets, No. 10 blue annealed, 2.15c; No. 28 black, 2.60c; No. 28 galvanized, 3.60c.

CHICAGO

Steel bars, 1.65c; iron bars, 1.65c; hoops, 2.15c; shapes and plates, 1.65c; No. 10 blue annealed sheets, 1.95c, black, No. 28, 2.45c; galvanized, No. 28, 3.50c.

PHILADELPHIA

Steel bars, 1.80c; structural shapes, 1.80c; plates, 1.80c; iron bars, 1.70c.

NEW YORK

Steel bars, 2.00c; structural shapes, 2.05c; plates, 2.05c.

CHANGE FOR BETTER

Is Very Decided—Orders for Heavy Tonnages Placed.

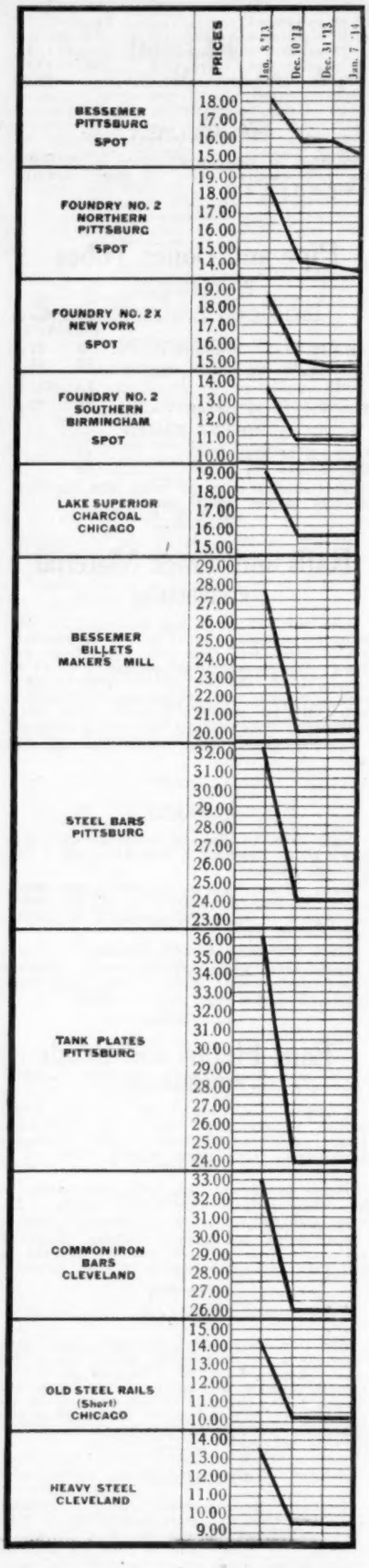
New York, Jan. 7. (By wire.)—A complete change for the better has come over the finished steel market, especially during the past week, according to leading makers and new business is much heavier. Resistance offered by manufacturers against loading up on the present basis of prices seem to be more effective and consumers are now coming in much more freely, so that some companies feel justified in advancing prices. The Steel Corporation is withdrawing all outstanding quotations of 1.15c, Pittsburgh, for early shipment, and is now asking 1.20c, first quarter, and 1.25c, second quarter, on plates, shapes and bars. The American Steel & Wire has also withdrawn prices and is quoting only on application.

New business of the leading maker is much heavier and early indications are that January will show a gain rather than loss of tonnage for the first time in many months.

December's loss in unfilled tonnage will be about 100,000 tons Tin plate mills of the Steel Corporation are running 88 per cent and sheet mills 75 per cent this week.

The Pressed Steel Car Co. has placed about 20,000 tons of car material with Pittsburgh mills, running into second quarter and is understood to have been unable to shade 1.20c. The Standard Oil Co. is a liberal buyer.

PRICE CHART



SEVERE DEPRESSION

In Automobile Industry With Exception of Trucks.

Detroit, Jan. 6.—Despite the encouraging statements that are issued from time to time by the manufacturers of motor cars; despite the willingness of Detroit business men, in general, to back up the industry and despite the newspaper talk that the automobile business, right now, is in a most flourishing condition, there is no gainsaying the fact that with many of the Detroit companies business is greatly reduced.

Interviews with leading manufacturers in this city led to the belief that factories were running very strong on their 1914 output, but a more careful investigation into the accessory business disclosed the fact that not more than one or two, and possibly three, automobile concerns are making full time. And it is in the accessory business that the sting of a hold-up in the money markets is first felt.

An engineer who is connected in a prominent way with one of the largest accessory concerns in Detroit, gave THE IRON TRADE REVIEW the following interview on condition that his name would not be used in connection with it:

"Conditions in the automobile game in Detroit are not at all encouraging despite the highly colored and many-adjectived statements of some publicity managers of these concerns. I do not believe that more than three concerns are running full time and I know, positively, that men have been laid off by the thousands; not hundreds, mind you, but by thousands, from the different plants.

"It fell to me to visit one of the most prominent concerns in Detroit just a few days ago. At the time the company was holding a salesmen's convention and in view of this occasion it is but natural that the concern would endeavor to put on every appearance of prosperity. Yet, in spite of this, not more than 500 men were working in the plant. And it is a plant that under ordinary conditions would give employment to 1,500 or 2,000 men.

"The concern with which I am connected is running on a day force alone, whereas a year ago we were running night and day. A year ago we were running in two shifts of 1,200 men to the shift. Today we are giving employment to not more than 1,200 men in our shops. On another occasion, I went into an engineering company's plant that once gave work to 100 men. Just two men were at work in the foundry part.

"The larger concerns, such as the Ford, Studebaker, Cadillac, Chalmers, and perhaps one or two others, are reported as doing a big business. I can say this that one of the larger concerns dismisses a man on the least pretext. And 'least pretext' is the proper wording.

"There isn't a factory in the city that is not besieged each morning by hundreds of men looking for work. And this army includes skilled laborers as well as common workmen. A year ago, the manufacturers of motor cars would have jumped at the opportunity to get skilled workmen. Now, well, now there isn't any room for the man who is out of a job."

Different lamp concerns are running more slowly than at this time last year and the general impression is that while the country is not overstocked with automobiles, the feeling of uncertainty in the money market prevents would-be buyers from making what they might consider a needless investment at this time.

The motor truck business is in pretty fair shape and the builders of light trucks declare that they are doing a much better business now than a year ago.

NEW COMPANY

Formed to Carry on the Business of Milliken Bros., Inc.

Announcement is made of the formation of a new corporation to take over the plants and business of Milliken Bros., Inc., New York, under the same name. The operating management has been retained, assuring continuance of policies and methods. The new company plans to have $1,000,000 of quick assets in addition to its real estate, buildings and fixtures, and the property is free of mortgage lien. Provisions are being made to increase the capacity of the fabricating plant and to develop both domestic and export business. Officers of the new company are: President, William Salomon; vice president, Francis Dykes; secretary, George E. Barrett; treasurer, A. A. Connon; directors, Jules S. Bache, Frederick G. Corning, Thomas Denny, Francis Dykes, C. McK. Lewis, William Barclay Parsons, William Salomon, William J. Saunders, Cornelius B. Tyler.

The purchase by the Bethlehem Steel Co. involved the open-hearth furnaces and rolling mills. The price was about $300,000.

The Business Man and Legislation

Editor THE IRON TRADE REVIEW:

I wish to commend most heartily your editorial of Dec. 18, on the "Summons of Business Men to Action". As a member of the legal profession, also as a business man, and one who has for seven years been a member of the Illinois legislature, I appreciate most heartily the spirit of your editorial. I have not read Mr. Grant's address to which you refer—but I have felt as a serious handicap to proper legislative action the ignorance of the ordinary business man of legislative matter, his proneness to concentrate so closely on his own affairs as to exclude his interest in the demands which are being continually pressed at every state capitol, often with great justice, and his too frequent disposition when some such demand affects him to take a narrow view and to be simply an objector, without any affirmative suggestion, and to condemn everybody, if he gets hurt.

It is true enough that this business man usually has some good reason for his protest; but unless he is willing to wake up and take an active interest in solving some of the questions that are being urged, he cannot complain of the results. One of the most frequent objections I have heard him make before committees at Springfield, Ill., is that he will be handicapped by the competition of some fellow just over the state line doing business in Indiana or Michigan or Wisconsin, who is not affected by the proposed act. This is a real objection. But it cannot stop legislative action, if there is reason for action. Otherwise the same objection could be made at every state capitol and no legislation could be had. To my mind there is an imperative demand that all industries in the same line of trade should get together in some proper associations, study the problems that are likely to be presented to the various state legislatures affecting their industry and work to the end of co-operation with the labor organizations getting uniform state legislation.

Again let me thank you for your editorial. In my observation our state legislatures, with all the bad that is in them, are not as bad as frequently painted and average fairly up with the moral standards of the business community.

MORTON D. HULL.

Chicago, Dec. 19, 1913.

D. C. Boyd has been elected president by the stockholders of the newly organized Galion Iron Works & Mfg. Co., Galion, O.

THE IRON TRADE REVIEW
DEVOTED TO THE IRON, STEEL, MACHINERY AND FOUNDRY INDUSTRIES

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Cleveland, January 8, 1914

Some Features of the Letters

In the letters from manufacturers and others prominent in the iron and steel and machinery business, published in THE IRON TRADE REVIEW of Jan. 1 and today, there is unanimity of sentiment on several points, especially in regard to maintaining the quality of product and not reducing wages except as a last resort. Never before, we believe, has there been during a period of depression as strong sentiment in favor of maintaining wages and of keeping as many men as possible employed. The plan has been to give as many men work as possible, even if all of the employes of a company were compelled to work part time. So far as we are aware, the suggestion made by William B. Dickson, former vice president of the United States Steel Corporation, that the 12-hour day be abolished, has not been adopted. The present seems, however, to be a favorable time for the more general adoption of the three-shift system and we should like to see this subject fully discussed.

As to the reduction of cost by introducing new methods of manufacture, some very helpful suggestions are made and we especially commend careful reading of paragraphs relating to this phase of the problem.

As to whether great companies are more economical in their operations than the smaller ones, there is difference of opinion. No feeling of hostility is shown to the greatest corporation in the steel business. It is indeed a high tribute to the United States Steel Corporation for a president of a competing company to say that the Corporation is the most notable example of the getting together under one management of many plants, according to a plan which is economically correct. President Felton, of the Pennsylvania Steel Co., not only makes this assertion, but says that these combinations have demonstrated their economical advantages and that, if they are broken up by governmental action into their formerly existing units, an economic crime will be committed.

Another noteworthy feature of the letters is the general agreement that there should be some sort of governmental supervision of business and several of the most prominent writers of the letters, such as Mr. Topping and Mr. Felton, are inclined to the German method of supervision. We believe it is true, as President Felton says, that this country will solve the general corporation problem if it sets about it with the same energy that has been applied to other questions of corporate regulation. There are already encouraging indications that this solution will be brought about without such clashing of business and government as we have seen in the past few years.

Temporary Depression

We publish elsewhere in this issue an article by our Detroit representative on the condition of the automobile industry in that city. The correspondent was instructed to get at the truth concerning conditions and he seems to have done it. That the present depression in the automobile business is severe cannot be denied. This is due in part to the fact that the business is changing to some extent. The automobile is being used more for business purposes and relatively less for pleasure, and this fact is reflected in the statement made by our correspondent that the motor truck business is in fair condition. Those to whom automobiles are luxuries are not spending money for new machines, but the demand for business purposes is steadily increasing, and it is probable that before long there will be a distinct revival in automobile manufacturing.

The Solidarity of Humanity

A Cleveland mechanic, in a letter to the editor of THE IRON TRADE REVIEW, says:

"In regard to your article, 'Why a Boycotter Squirms', I would say: Because your and other papers are eternally advertising unionists as comprising 'labor', all labor, whereas the last census enumerates but about 5 per cent of the working classes unionized. Instead of being as claimed, the entire labor dog, they are but the tip of its tail. Why then do you treat them as wagging the whole dog? If all papers ceased to advertise them, otherwise than by advising all non-unionists to rigidly boycott all stores handling union-made goods, all street and other means of transportation, as much as practicable, very soon there would not be enough labor unionism to make a squirm."

In the editorial referred to by our correspondent,

in which comment was made upon the attitude of Samuel Gompers concerning the anti-trust law, there is not a word to indicate that Mr. Gompers expresses the opinion of all men who toil. Unfortunately, on account of the official position of Mr. Gompers and other union leaders, they have more prominence and receive more attention than does the ordinary workman, whether he be a member of a union or not. It is to be regretted that there is not some method of obtaining an expression of opinion from the unorganized workingmen. A few, like our correspondent, occasionally write to the newspapers or express their opinions in other ways, but the masses, for the most part, remain silent.

As for advising a boycott of union-made goods, that would be just as abhorrent to us as it is for the union to boycott goods made by men who are not members of unions. The boycott is illegal and un-American and should be discouraged by everybody.

Instead of pursuing the policy proposed by our correspondent, we deplore the class feeling which is so strong in many parts of the country and endorse the attitude of those who are trying to establish a feeling of good will among all men. At the age of 78, Dr. Washington Gladden is still pounding away at both employers and employes who show a selfish and malicious spirit. Referring the other day to the I. W. W. and other intolerant organizations, Dr. Gladden said that he would address them as follows:

"You say that you are going to exterminate all the people who are not of your class, because you have the power. Let us tell you what we are going to do to you, because we have the power. We are going to see that you have justice; that your rights are respected, your wrongs redressed, your burdens lifted, all the gates of opportunity set wide open before you. We are going to kill all the rapacities that prey upon you; we are not going to get rich ourselves by impoverishing you; we are going to share with you all the good that the earth produces; we are going to devote our lives to making your lives happy and prosperous. We want no privilege or benefit for ourselves that we do not crave for you; there is no prize of life that shall not be open to all who have the power to win it.

"You say that we do not belong to your class, and that no good shall come to us until we join it; we say that you do belong to our class, and that nothing you can possibly do can get you out of it, for our class is humankind, and we are going to show you, because we have the power, that the solidarity of humanity is a great deal bigger and more beautiful than the solidarity of labor."

With more of the spirit of Dr. Gladden and less advocacy of the boycott and all forms of intimidation and violence, great progress in improving the relations of capital and labor will be made this year.

A very striking manifestation of the right spirit of employer toward employe is shown in the recent address of Judge Gary, of which an abstract was published in THE IRON TRADE REVIEW of Jan. 1. Judge Gary showed not only a realization of the fact that suffering is likely to result among employes of the Corporation on account of the present depression, but also an appreciation of the importance of the presidents of the subsidiary companies personally getting in touch with the families of employes. He trusts that the presidents will visit the places where the families live and, if necessary to prevent suffering, will contribute for the relief of those who are idle through no fault of their own. A very practical suggestion is that rent for company houses be suspended until former employes who are without work are able to pay. With generous treatment like this on the part of employers, the suffering of the period of depression will be ameliorated and the "solidarity of humanity" will be promoted.

The giving away of ten million dollars is not an easy matter, for it is likely to do more harm than good. The plan of the Ford Motor Co. is a wonderful example of how not to give wisely.

Old Truth Revivified

The retirement of partners of the banking firm of J. P. Morgan & Co. from numerous directorships of corporations was stated to be due to "apparent change in public sentiment in regard to directorships". Perhaps it would be more correct to say that it is not so much a change of sentiment as a re-awakening to the truth of the biblical injunction that no man can serve two masters. In spite of the fact that many high-minded men connected with banks have served as directors, the temptation of one holding many directorships to enrich oneself at the expense of some corporation or of the general public is great.

On Tuesday, of this week, Judge W. L. Day, of the United States court, in deciding a matter relating to the receiverships of the Wabash and Wheeling & Lake Erie railroads, said:

"Considering the entire record, it is quite apparent that the regrettable situation resulting in the insolvency of these railroads had its inception in the ambitious minds of the originators of the syndicate, who in the hope of material personal gain considered corporate entities as mere forms to be used for their own advancement."

It is not material whether the wreckers to whom Judge Day referred were bankers or railroad men. The point is that they were not true to their trust. They pretended to serve several masters, but were false to all.

It is fortunate that the great banking firm which has been the leader in so many constructive movements is taking the lead now in breaking up a practice which has become thoroughly out of harmony with the highest ideals of modern business. The country will be much better satisfied to see bankers stick to the banking business and let industrial concerns manage their own affairs.

Book Review

The Red Iron Ores of East Tennessee, by Ernest F. Burchard; Bulletin 16, Tennessee State Geological Survey; 8 vo., 173 pages, 17 maps and plates, 30 text figures; Nashville, 1913.

In this report, just published by the Tennessee Geological Survey, Mr. Burchard has presented the first discussion of the red hematites of East Tennessee from a modern standpoint, for it is over 30 years since any comprehensive description of this ore region has been issued. In the interval there has been considerable development in the ore fields, and there has been a far more important development in the precision and certainty with which geologic work is carried out.

The investigations covered by this bulletin were carried out during 1911, at the joint expense of the United States Geological Survey and the Tennessee State Geological Survey, with some help from the Chattanooga Chamber of Commerce. The field work extended over the entire Tennessee red ore region, and also took in certain portions of northern Alabama and northwest Georgia. A later bulletin, to be issued by the Federal Survey, will include reports upon these Alabama and Georgia areas.

The bulletin now published by the state survey covers descriptions of all the Clinton and other red hematites of east Tennessee—a region whose importance is often minimized because it is overshadowed by the more complete industrial development of the Birmingham district. The field work on which it is based seems to have been carried out with the same careful precision which is so characteristic of Mr. Burchard's investigations, and the data are presented in detail, yet clearly and concisely. The volume itself is well made up, and has the great advantage of being of usable size. Some of the more important industrial and scientific results brought out by the report may be summarized briefly for general use.

With the exception of a small area near Nashville, which can apparently be dismissed from serious consideration, industrially, the red ores of Tennessee occur in the eastern portion of the state, along the eastern flank of the Cumberland plateau. Most of the outcrops immediately border the plateau; but some of them are found further out in the great valley itself.

All of the ores here considered are essentially red hematites, usually oolitic or fossiliferous, and all of them occur as sedimentary ores, in distinct beds. As to geologic origin they are therefore practically uniform, but certain distinctions must be drawn as to their geologic age. The great bulk of the Tennessee red ores, it is true, are of Clinton age, like the red ores of Nova Scotia, Wisconsin, New York and the Birmingham region. But in addition to these Clinton red ores, Tennessee contains in a few localities beds of red hematite in rocks of different age. In the Maryville region, for example, the red ores are in lower carboniferous beds; while in the vicinity of Sweetwater, near Riceville, and east of Knoxville, red hematite beds are found in rocks of Ordovician age. With few exceptions, however, the commercial red ores of east Tennessee may be assumed to be of Clinton age, like the more important red ores elsewhere in our southern and eastern states.

The main belt of Clinton ore outcrops enters Tennessee from Virginia near Cumberland Gap, and extends southwestwardly across the state to the vicinity of Chattanooga. This is a distance of approximately 170 miles, measured directly. The ore seams are, however, not absolutely continuous for the entire distance, being absent in part of the belt. Further, the ore beds are for considerable distances unworkable because of extreme thinness. On the other hand, for much of the distance from Virginia to the southern border of Tennessee, there are folds in the strata which result in duplication of the ore outcrop. Allowing for all of these factors, we find by scaling from the general map in the bulletin that the total length of Clinton ore outcrops in Tennessee is in the neighborhood of 300 miles. Of this total, about 115 miles are reported as containing an ore bed over two feet in thickness. From these figures it is obvious that there is an enormous total tonnage of red ore in east Tennessee; but they also suggest that it would be hazardous to indulge in very extravagant hopes as to the percentage of this total which can be considered workable in the near future.

At various points where the red ore is actually worked for furnace use, thicknesses are reported as follows: Rockwood, 2½ to 4 feet; Crescent, 5 to 6 feet; Chamberlain, 5 to 7 feet; La Follette, 3¾ to 5 feet.

The ore varies, of course, in grade through the usual range of Clinton ores. Regarding this point, Mr. Burchard states that the usual range of the hard ores used now at Tennessee furnaces is between the following limits: Iron, 25 to 45 per cent; lime, 8 to 20 per cent; silica, 4 to 15 per cent; alumina, 4 to 10 per cent; phosphorus, 0.25 to 0.75 per cent, and sulphur, from a trace up to 1 per cent.

Nine stacks use the Tennessee red ores as their principal ore supply, though commonly some brown ore is used in the charge. The furnaces in question are Chattanooga, Citico, South Pittsburgh (2), Dayton (2), Rockwood (2) and La Follette.

Obituaries

James Storer, Cleveland, secretary and treasurer of the George Worthington Co., died Jan. 2 from heart trouble at the age of 73 years.

Charles R. Brown, Norwalk, O., formerly president of the Huron Steel & Iron Co., is dead of pneumonia. The interment will be at Detroit.

John S. Roake, retired manufacturer of boilers, died Dec. 30, at his home in Brooklyn. He was in his eighty-second year and was a Civil War veteran.

Cyrus E. Mead, aged 39, Dayton, O., founder and first vice president of the Mead Engine Co., is dead from injuries received when his automobile was struck by a traction car.

George Herrick Billings, president and director of the Compressed Steel Shafting Co., Boston, aged 69 years, is dead. He was inventor of several machines used in cold drawing of steel and had been a manufacturer of cold-drawn steel since 1889.

William C. Dalzell, an iron manufacturer of South Egremont, Mass., died in that city, Jan. 2, aged 68 years. He was president of the Dalzell Axle Co., president and treasurer of the Dalzell & Ives Iron Box Co., and had other business connections.

George W. Kittredge, editor of Sheet Metal and a pioneer in the use of sheet metal for building ornamentation, died at his home in Passaic, N. J., Jan. 2, at the age of 65 years. He was a native of Dayton, O., and came to New York city in 1879, where he devoted himself to the development of geometrical methods for laying out sheet metal workers' patterns. He was the author of Kittredge's Metal Workers' Pattern Book.

George Martin Luther, secretary of the Nichols Copper Co., 25 Broad street, New York, died on Christmas Day at his home in Brooklyn. He was born Aug. 25, 1849. In 1885 he became treasurer of the C. W. Hunt Co., and about 20 years ago he became identified with the Nichols company. He was a graduate of Cornell university and was a member of the Cornell Club, Chemists' Club, the Copper Producers' Association and other organizations.

Helpful Policy Toward Big Business is Needed

Says President Felton—A Machine Tool Manufacturer Sees Little to Fear in Foreign Competition—Opinions on Meeting Conditions Under the Tariff

Several valuable letters in reply to THE IRON TRADE REVIEW's request for an expression of opinion as to how manufacturers should meet the more active competition of foreign nations under the low tariff were received too late to be included with the other letters published in the issue of Jan. 1.

President Edgar C. Felton, of the Pennsylvania Steel Co., Philadelphia, writes as follows:

EDITOR THE IRON TRADE REVIEW:—

Referring to your recent letter, asking how the steel manufacturers of the United States may best meet the more active foreign competition which is sure to come under the existing low tariff, I am very glad to give you my views on this subject. I will take up first the specific questions which you ask:

1.—*Would you reduce costs by lowering the quality of product?*

The answer to this question is, I think, self-evident. Lowering the quality of our manufactures would stimulate rather than shut off importations. The better the quality of our products the more difficult it will be for the foreign manufacturer to enter our markets. In most steel products, quality and price are not interchangeable terms. A certain standard of quality must exist. Price is of secondary consideration. Steel rails are today a good illustration of this point. Because of the severe service demanded by the operating conditions on American railways, the quality of American rails has been improved until they are now very much superior to those made by European mills. Foreign rails would not meet the requirements of American railways today. In this case, the superior quality of the American product will, in large measure, take the place of the protective duties which have been removed. Foreign manufacturers can, of course, improve quality to our standards, but this will take time and a large expenditure of capital.

2.—*Would you reduce costs by reducing wages?*

If the existing prices continue, wages will have to be reduced. Wages being the principal item which make up the cost of all commodities, no considerable reduction in cost can be made unless they decline. The economic law by which wages advance and decline with the advancing and declining prices for commodities is immutable in the long run. This law has been set aside by artificial influences in the years just behind us, but it must become operative if the period of depression is long continued. You can hitch a baloon to Newton's apple and keep it in the air for a time, but the gas will escape and the apple will fall in the end.

3.—*Would you reduce costs by introducing new methods of manufacture?*

Improved methods of manufacture are being constantly put in operation by all manufacturers of steel, but it must be remembered that the older the industry and the more highly perfected it is, the less opportunity there is to effect substantial savings by introducing new methods. Power costs can be lessened by a wider use of internal combustion engines; blast furnace fuel can be cheapened by replacing bee-hive coke ovens by those of the by-product type, and profitable uses can be found for many by-products of steel manufacture now going to waste. But such savings are small when measured in cents per ton of product, are slow of realization, and generally require the investment of large amounts of capital. Nothing revolutionary can be expected from them, nor will they at all make up for the reduction in duties brought about by the enactment of the Underwood bill.

So much for your direct questions. I believe, however, that there are more important questions than these confronting the American steel manufacture today. I refer to the attitude of the government of the United States and of many of the individual states toward what has come to be known as "big business". The gathering together under one management of many plants engaged in the same lines of manufacture which has been going on in the steel trade during the last 15 years in this country, and of which the United States Steel Corporation is the most notable example, is economically correct and should be encouraged by legislation rather than the reverse. These combinations have not resulted in higher prices to the consumer, but rather the opposite. Since they have existed, prices have not been subject to the violent fluctuations which ruled prior to their formation, a fact of great value to the consumer, since it removes the speculative element from his buying, and the wages of labor have undoubtedly been advanced under their operation. They have demonstrated their economical advantages and if they are broken up by governmental action into their formerly existing units, an economic crime will be committed. It would be as reasonable to expect efficient operation from the great railroad systems of the country if these were broken up into their constituent units, with the multiplication of operating officials, terminals, etc., necessary thereto, as to expect low production costs and cheap prices to consumers from the formerly existing units of the great steel plants of today, if these were operated singly rather than in combination.

Not only should this modern and economical method of production be encouraged, but trade agreements between corporations engaged in the same line of business should be allowed under proper government supervision. The present attitude of our government toward this question is in marked contrast with that of foreign governments. In *The Iron Age* of Dec. 18 may be found the following in their weekly letter from Berlin:

"About the end of last week it was announced that an agreement among the tube manufacturers for an organization had been reached, the question of quotas having been satisfactorily solved." . . . . . "The syndicate is to be organized for a period of ten years, beginning Jan. 1, 1914."

On the next page, a cable from London says: "The galvanized sheet makers have formed an association based on regulation of output." Should American manufacturers attempt to follow their German and English brothers, they would bring down upon themselves the whole power of their national government. It is a strange thing that, in this era of peace, when our own government is foremost in advocating the abolition of war between nations, that same government should be actively engaged in inciting its own people to industrial war among themselves.

The question which naturally suggests itself is how industrial combinations may be controlled, and how their arrangements between themselves can be regulated so that the interests of the general public may not suffer. This question presents many difficulties, no doubt, but it is not impossible of solution. Germany and other nations

of continental Europe have solved it by a mild sort of government supervision. We certainly can solve it if we set about it with the same energy we have applied to other questions of corporate regulation.

These questions undoubtedly transcend in importance the direct questions which you have asked. If we are to compete with foreign manufacturers, we must operate under conditions at least as favorable as theirs, and our government's attitude toward "big business" must be helpful rather than destructive as at present.

E. C. Felton, *President.*

Little to Fear in Foreign Competition

Manager F. H. Brown, of the W. P. Davis Machine Co., Rochester, N. Y., writes as follows:

Editor The Iron Trade Review:—

We have been giving your communication of Nov. 20 considerable thought since its receipt in order to submit to you some intelligent reply to your inquiry. While it is true that the new tariff law has taken 15 per cent off the duty on machine tools, still, we are convinced from a study of the foreign designs, there is little to fear on the part of the American manufacturers in the way of English or German competition. Of course, if the Germans (who certainly are progressing and enterprising people) find that by copying American designs they can secure a market in this country, they will spare no pains nor let any obstacle stand in their way to accomplish their purpose. It will be necessary for them, however, to perfect selling organizations in this country and our experience leads us to believe that the American buyer would be sufficiently loyal to his own country to prefer the original to a foreign copy, even though it could be purchased at a less cost.

We do not think there is a possibility of any of the machine tool manufacturers reducing their prices. The cost of labor today is so high that, as a matter of fact, the manufacturers should receive a larger price for their product, as the proportion of profit has been greatly lessened in the last five years, due to the constant increase in the labor cost. We are further of the opinion that the American labor is the most efficient in the world, and the production, therefore, per man is greater than in Germany, England or France. The American machine tool manufacturers are studying the question of cost more than ever before, so that they know exactly where they stand on every item that enters into the article they are manufacturing. They also have thoroughly investigated the question of burden, or overhead expense, and know today almost to a cent their cost of production. We doubt very much whether this is the case with our foreign competitors.

In regard to loyalty of our employes, we believe this can be sustained by keeping a sufficient amount of orders coming through the shop so that they are sure of permanent positions, with working conditions made as ideal as possible for safety, sanitation, special conveniences for handling heavy material, plenty of daylight and sufficient equipment to enable them to get out their work with the least annoyance and inconvenience.

The W. P. Davis Machine Co.
F. H. Brown, *Manager.*

Treat Employes Generously

An Illinois manufacturer who does not wish his name published, evidently because he does not like to appear to be praising himself, writes as follows:

Editon The Iron Trade Review:—

Our only way of meeting foreign competition is by the use of automatic machinery and improved methods. It would certainly not be wise to reduce the cost by lowering the quality of our product. In fact, it would be disastrous. Neither would we want to reduce the cost by cutting wages, although this is about the only thing left after we have exhausted our efforts in the way of machinery and improved methods.

Our idea is that we can get the best results from our men by using the best machinery, by giving them well-ventilated and well-lighted shops which are sanitary in every respect so far as it is possible to make them so. An employer can only enjoy the loyalty of his men by showing them conclusively that he is doing everything he can for their good. This is a plain business proposition.

We pay our men as good wages as we can afford. We have spent a great deal of money in safety devices, in putting up buildings that are well lighted, that are comfortably warm, have put in wash rooms, locker rooms and shower baths (in our foundry). We contribute to a sick benefit fund for our employes and maintain entirely at our own expense a pension fund for our old employes. In time, all these things, if they are kept up, will gradually indicate to the employes and convince them that we have their welfare in mind. On the other hand, there are those who would try to persuade the employe that there is some ulterior motive which is not in his interest. For that reason, it takes some time for the employe to convince himself that the employer has his welfare at heart.

HIGHEST STRUCTURE

Pan-American Building in New York to Overlook All Others.

New York, Jan. 6.—Tentative plans have been filed in this city for a building which is to be the highest structure in the world. This is to be known as the Pan-American building, to be located on the block bounded by Broadway, Eighth avenue, Fifty-seventh and Fifty-eighth streets. The structure, as outlined in the plans, will be 894.6 feet high and will cost $12,500,000. The preliminary designs indicate only the elevation of the structure showing that it is to be 51 stories high with basement and sub-basement. The Pan-American States Association, Hudson Maxim, president; Henry Birrell, treasurer, and Wm. C. Edgerton, secretary, is the prospective owner. The building will be used as a headquarters for all matters pertaining to the fostering of trade relations between this country and South American countries.

Build Soil Pipe Foundry.—Formation of a company to build a soil pipe foundry at Gadsden, Ala., is going on. John Birdwell, connected with that industry in Birmingham for many years, is to be general manager and in charge of construction. T. G. Carlisle, formerly with the Coosa Pipe & Foundry Co., will be connected with the company.

No Tonnage Tax.—Governor Ferris, of Michigan, has announced there will be no special session of the legislature, this making impossible of success the movement looking toward a tonnage tax bill for an impost on iron ore.

Employes of the Detroit Insulated Wire Co., Detroit, shared in distribution of a portion of the profits Christmas. Salaried employes employed the entire year were paid 1 per cent of their yearly salaries, and workers paid by the hour received 2 per cent of their total wage for the year as bonus. The money was deposited in a savings bank to the credit of each employe.

IRON MINING NEWS

Hopeful Conditions on Cuyuna

Conditions are very hopeful on the Cuyuna iron range. The Rogers, Brown Ore Co. mines opened Jan. 5 after a holiday layoff, working full crews. The Iroquois Iron Co. will take the entire output of the Armour No. 2 mine. The Armour No. 1 mine may be opened again when navigation begins. The Kennedy mine at Cuyuna will produce its regular quota. W. H. Locker, of the Locker-Donahue Co., has been at Pittsburgh and Philadelphia, and has closed contracts to take the entire coming output of the Cuyuna-Duluth and the Cuyuna-Mille Lacs mines. The Rowe pit mine will in 1914 make its first shipments and will supply the furnaces of the Pittsburgh Steel Co. The Soo railway has built a round house and machine shop at Riverton, near the mine, and is preparing its tracks to handle the heavy tonnage. A thousand steel ore cars have been ordered for Cuyuna range traffic. The Northern Pacific is under contract to build an extension from the Cuyuna-Mille Lacs mine to the Duluth-Brainerd mine, which latter has its shaft in ledge and will do some shipping in 1914. The Iron Mountain mine near by will also ship its first ore in 1914. The Cuyuna Iron & Manganese Ore Co. will convert its holdings north of the Pennington pit mine into a pit mine. A stretch of ore three-quarters of a mile long and 300 feet or more wide at an average depth of 57 feet has been uncovered by drilling. The land is dry and the company has surface enough for its own for dumps. There is no labor trouble on the range and the work of drilling, mining and development is being carried on with enthusiasm.

Menominee Mine Closed

The Milwaukee-Davis mine, operated for the last four years by the Breitung interests, has been closed and its force of 50 men transferred to the company's other properties at Negaunee. The Milwaukee-Davis is one of the oldest mines on the Marquette range. It is practically worked out. What little ore is left is of such low grade that it was not profitable to mine it. The Breitung interests will abandon the property and remove all of the equipment. About 2,000 tons of ore are in stock. Other Marquette range mines which are idle include the Champion. This is a property of the United States Steel Corporation. It has been out of commission for several seasons and there are no indications it will be restored to the active list this year. The Champion is a good property, producing hard ore of several grades.

Developing the Tully Mine

Corrigan, McKinney & Co. have a large force of men employed at the Tully property at Iron River, Menominee range, and are making ready to operate the mine extensively. A miners' dry, which will be the largest in the district, is nearing completion. An office building is also being constructed. The engine house is ready for duty. Lumber for additional dwelling houses has been assembled. A steam shovel is excavating for a large stockpile ground.

New Norrie Shaft

In record-breaking time, the big *New C* shaft at the United States Steel Corporation's East Norrie mine at Ironwood has been holed through for a distance of 1,225 feet. The achievement is one of the most notable ever recorded on the Gogebic range. The shaft is known as *New C* to distinguish it from the older one across the caved surface to the north and which now is called the *Old C*. When the new shaft goes into commission, the *Old C* will be dismantled and there will disappear the finest wooden headframe ever erected in the Gogebic district. However, the wooden shaft in the Lake Superior region has had its day. It has been supplanted by the steel headframe that is better in every way and has now become standardized. Of the 1,225 feet for which the *New C* has been opened, 850 feet was attained by sinking from surface and 375 feet by raising from the 17th level. The shaft is, approximately, 18 x 11 feet, inside measurements.

New Water and Sewer System

At its town at the Chicagon mine, the Rogers-Brown Ore Co. has installed both a water and a sewer system. All of the buildings accommodating the 200 employes and their families are connected with the mains. Pure water is obtained from a large spring and is pumped to a reservoir on a hilltop. The pressure is sufficient for fire protection.

Marquette Range Developments

Much development work is in progress on the Marquette range. Among the new mines being opened are the Mackinac and Gardiner, of the Cleveland-Cliffs Iron Co., in the Gwinn district; the Isabella, of the Cascade Mining Co., in the Cascade field; the Lucky Star, of the Cleveland-Cliffs Co. and the Breitung interests, at Negaunee; the Athens, of the Cleveland-Cliffs and Pickands, Mather & Co., at Negaunee, and the Iron Mountain Lake, of the Jones & Laughlin Co., at Ishpeming. Several properties already on the list of producers are being prepared for larger production, among these the Volunteer, Rolling Mill, Breitung Hematite and the Cleveland-Cliffs properties at North Lake. At the latter, 400 men are now at work. A recent shipment to the Rolling Mill mine, a Jones & Laughlin property, was a consignment of fir timber from Washington. The big sticks will be used in shaft work. Steel headframes are to be erected this winter at the Isabella, Lucky Star and Breitung Hematite No. 3. Much steel work is also to be done at the Mackinac and Gardiner. The Jones & Laughlin Co., which is seeking for ore at Greenwood, west of Ishpeming, has three diamond drills in steady operation there. Holes are being put down to depths of 1,700 feet. The rock is particularly refractory and progress is slow.

Drilling West of Brainerd

Some interest has been attracted to the region west of Brainerd by the announcement that J. F. Frederickson, of Duluth, has resumed drilling in section 27, township 133, range 29, across the Mississippi river from Barrows. The Barrows mine is stockpiling and sinking its five-compartment shaft. The Adams mine at Oreland is continuing its drifting operations and getting ready to stockpile. The Brainerd-Cuyuna mine in the city limits of Brainerd has its steam plant in operation and is down 62 feet with its shaft. Good progress in stripping is being made at the Pennington and Thompson mines near Crosby. The Jones & Laughlin Steel Co. has drills at work check-drilling the Thomas Feigh lands near the Pennington pit mine, and this property will ultimately be made a pit mine. The Cuyuna-Duluth mine

at Ironton is sinking its shaft to a greater depth and is mining on the first level. The Duluth-Brainerd mine in section 32, township 47, range 29 has its shaft 6 feet or more in the ledge.

Millie Mine Sold

The Dessau Co. is now the owner of the lease and equipment of the Millie mine. This property recently was sold at auction at Iron Mountain, Mich., and was bid in by B. J. Clergue, of Montreal, for the nominal sum of $18,000. Mr. Clergue represents the Dessau Co., control of which is understood to be lodged with the Lake Superior Corporation. Whether the transaction means the re-opening of the mine is not known. The Millie has been closed for several years. The property has never been fully developed and it is believed much better ore than yet produced will be found at greater depth.

Western Federation Loses

The Western Federation of Miners has been defeated in its attempt to take from the Ishpeming union a store building and $1,500 in cash on deposit in bank. The effort was made because of the subordinate body's withdrawal from the organization on account, it is claimed, of too frequent assessments on the membership. A charter provision in small type and not noticed at the time provided that in cases of the kind, the property of the seceding organization should go to the federation. Circuit Judge R. C. Flannigan, at Marquette, took the case from the jury, holding there was no cause for action.

State Cancels Lease

Because of the non-payment of royalties, a state mineral lease has been seized by the commonwealth of Minnesota. The instance is the first of its kind yet recorded in the Gopher state. State Auditor Iverson has taken possession of the Alberta mine, near Virginia, Mesabi range, operated by the Minnesota Mining & Development Co. While the amount of money due is small, payment has been delinquent since Oct. 20. The tract consists of 150 acres and is said to contain a valuable ore deposit.

A washer for preparing iron ore for use in its blast furnaces is about ready to be put in operation by the Sloss-Sheffield Steel & Iron Co., at Russellville, Ala. It cost about $100,000.

Extras Charged by German Mills

More complete information of the extras asked by leading German mills on rounds, squares, flats and cold twisted steel bars has become available through quotations recently made to an eastern consumer by the Thyssen works, one of the most important producers of that country. The list of extras which is given below in equivalent American values clearly shows, as has been previously commented upon, that the German extras are considerably less than those of the schedule followed by the mills of this country and that the base sizes of the former are much more inclusive. Base prices recently quoted by this German maker figured about 1.25c principal Atlantic ports on Bessemer and about 1.28c, eastern port, for open-hearth steel, duty being included in both cases.

The following are the net extras in cents per 100 pounds quoted by the Thyssen works on rounds and squares:

EXTRAS CHARGED BY GERMAN MILLS.

Size. Rounds and Squares.	Extras, cents. Rounds.	Squares.
5/16 inch	22.25	22.25
1/4 inch	14.00	14.00
7/16 inch	11.25	11.25
3/8 inch	5.50	5.50
7/16 inch	2.75	2.75
1/2 to 5 inches	Base	Base
5 1/2 inches	11.25	11.25
6 inches	16.75	16.75
6 1/2 inches	22.25	22.25
7 inches	28.00	*
7 1/2 inches	39.00	*
8 inches	44.50	*
8 1/2 inches	50.00	*
9 inches	56.00	*
9 1/2 inches	61.25	*
10 inches	73.00	*
10 1/2 inches	78.00	*
11 inches	83.50	*
11 1/2 inches	94.75	*
12 inches	100.50	*

*Not rolled.

(The net extras on flat bars in cents per 100 pounds are as follows:)

Thickness, Width, in.	1/8 in.	3/16 in.	1/4 in.	5/16 in.	3/8 in. & over
3/8	28.00	25.00	19.50	14.00	11.25
1/2	22.25	19.50	14.00	8.25	5.50
5/8	22.25	19.50	14.00	8.25	5.50
5/8	16.75	14.00	11.25	5.50	2.75
11/16	16.75	14.00	11.25	5.50	2.75
3/4	11.25	8.25	2.75	2.75	Base
13/16	11.25	8.25	2.75	2.75	Base
7/8	8.25	2.75	Base	Base	Base
15/16	8.25	2.75	Base	Base	Base
1	5.50	Base	Base	Base	Base
1 1/4	5.50	Base	Base	Base	Base
1 1/2	5.50	Base	Base	Base	Base
2	*	Base	Base	Base	Base
3	*	5.50	Base	Base	Base
4	*	*	Base	Base	Base
4 1/2	*	*	Base	Base	Base
5	*	*	5.50	5.50	2.75
5 1/4	*	*	5.50	5.50	2.75
6	*	*	11.25	11.25	2.75

*Not rolled.

Round and square bars from 3/16 inch up to and including 5/8 inch and flat bars from 1/2 by 3/8 inch up to and including 5/8 by 1 1/8 inches, are put up in bundles of 100 pounds or 50 pounds. Loose bars are cut with an allowance of plus or minus 100 millimeters (4 inches), while bars in bundles are cut within plus or minus 50 millimeters (2 inches). The American base on rounds and flats is from 3/4 to 3 1/16 inches and on flats from 1 to 6 inches by 3/8 to 1 inch.

The extras for twisting cold bars with one complete twist on a length of not more than 12 times the thickness of the bar, given in cents per 100 pounds, are as follows:

Size, inches.	Extras, cents.
3/16	27.75
1/4	22.25
5/16	18.50
3/8	11.25
7/16	8.25
1/2	5.50
5/8	2.75
3/4	2.75
1	5.50
1 1/4	5.50
1 1/2	5.50

For intermediate sizes the price of the next higher size will be charged. Allowance in length is plus or minus 2 inches. Bars from 3/16 inch up to and including 5/8 inch are made up in bundles of 100 pounds or 50 pounds.

Increases Wages at Navy Yard

Readjustment of wages of navy yard employes, just completed by Secretary Daniels and Assistant Secretary Roosevelt, except in two instances, will mean an increase aggregating $50,000. The new scales, affecting employes in government shops in the various yards, went into effect Jan. 1. An official announcement pertaining to the readjustment has just been issued by Secretary Daniels.

The Washington navy yard, because of legal complications which the navy department has not yet straightened out, is not affected by the advance. An increase may be made for Washington yard employes soon, perhaps in a few days. For the same reason the employes at Indian Head proving ground and the yard at Annapolis, Md., are not affected.

The $50,000 increase will be divided among 1,400 employes. Reductions amounting to $1,500 will be taken from less than 50 employes.

The changes are made annually and are required by the law with a view to maintaining wage scales in the various navy yards at figures equal to or more than the wage scales obtaining in private institutions in the vicinity of the respective government yards. Each yard has a wage scale board which presents recommendations for readjustments. They are referred to the secretary, and this year were referred back to employes before being finally passed upon by Secretary Daniels and Assistant Secretary Roosevelt.

NEW BUSINESS

NORTHEASTERN STATES

KEENE, N. H.—Imperial Metal Products Co. is to erect a factory for manufacture of building material and metal furniture.

BOSTON.—Claremont Machinery Co. has been incorporated to manufacture machinery; $4,000,000; by James E. Carroll, John H. Pierce, John M. Foster.

CAMBRIDGE, MASS.—Boston Structural Steel Co. has been incorporated; $15,000; by William P. Shine, Paul Hunt, Elinor Gleneskie.

SOUTH BOSTON, MASS.—New England Iron Works Co. is building a boiler shop to cost $30,000. Plans by Herbert A. Wilson and E. C. Sherman, Boston.

ANSONIA, CT.—Ansonia Brass & Copper Co. is to build a two story addition, 60 x 440 feet, brick and steel, fireproof.

GROTON, CT. —Mystic Motor Co. has been incorporated to manufacture motors; $2,000; by J. D. Miller, H. P. Matthews, George McDowell, Brooklyn, N. Y., and H. M. Toxe, Mystic, Conn.

NEW HAVEN, CT.—Simplex Machine Co. has been incorporated; $5,000; by President, Raymond E. Dodge; secretary-treasurer, Samuel J. Newman, New Haven.

NEW HAVEN, CT. — The Connecticut Aeroplane Co. has been incorporated; $500,000; by J. D. Miller, H. P. Matthews, George Millikin of New Haven, Paul Webb of Hamden, Ralph H. Clark, Derby.

WATERBURY, CT.—W. R. Keavany & Son, Inc., has been incorporated to manufacture brass and steel goods; $25,000; by T. F. Carmody, W. E. Monagan, N. J. Larkin Jr., all of Waterbury, Conn.

AUBURN, R. I.—Universal Winding Machine Co. has bought plant of Maxwell-Briscoe Co. and will remove here from Providence.

BINGHAMTON, N. Y.—F. S. Converse Co. has been incorporated to manufacture fuel-handling machinery; $75,000; by B. A. Reynolds, M. F. and F. S. Converse, Binghamton.

JAMESTOWN, N. Y.—Curtis Machine Corporation requires automatic hot water pumping heating system for its enlarged plant here.

NEW YORK CITY.—Dukesmire Iron Works has been incorporated; $10,000; by C. T. Williams, F. and W. B. Dukeshire, 474 East Seventh street, New York City.

NEW YORK CITY.—Modern Washerless Faucet Co. has been incorporated to manufacture plumbing supplies; $50,000; by A. Paul, G. Peterson, of Brooklyn and W. F. Willis, New York City.

NEW YORK CITY.—Tamagno Mfg. Co. has been incorporated to manufacture sheet metal articles; $80,000; by D. B. and Lydie Tamagno and H. F. Price, 110 East Twenty-third street, New York.

NEW YORK CITY.—Plans have been filed for the erection of a two-story brick factory for the McConnell Coal & Ice Co., estimated to cost about $40,000. Frank Wennemer, 2136 Honeywell avenue, architect.

NEW YORK CITY.—Oppenheim, Collins & Co., West Thirty-fourth street, recently secured a site here, upon which an 11-story building as an annex to the present building will be erected.

NEW YORK CITY.—American Motor & Transmission Co. has been incorporated to manufacture machinery, etc.; $50,000; by C. H. Bassford, Newark, N. J.; E. V. Nixon, East Orange, N. J.; E. Reynolds, New York City.

NEW YORK CITY.—Pitz & Weber Iron Foundry, Inc., has been incorporated to do general foundry business; $10,000; by John F. Pitz, Joseph H. Weber, 87 Frankfort street, Morris Blau, 154 Nassau street, New York City.

PORT JEFFERSON, N. Y.—Meurer Steel Barrel Co. has been incorporated; $350,000; by Andrew Meurer, Jacob Meurer and William W. Shre, of Brooklyn.

SAG HARBOR, L. I.—Kehoe Stenographic Co., recently incorporated, plans factory here to make machines for writing shorthand. Leslie P. Robinson, this city, representative.

SYRACUSE, N. Y. — Sagamore Motors Corporation, recently incorporated with $75,000 capital, will erect a factory at once. J. S. Brown is one of the incorporators.

SYRACUSE, N. Y.—Hurwitz Bros. Iron & Metal Co. has been incorporated to deal in metals; $50,000; by L. L. Hurwitz, M. Hurwitz, R. C. Hurwitz, Syracuse.

WELLSVILLE, N. Y.—Stoetzel Blower Co., Inc., has been incorporated to manufacture pumps and blowers; $250,000; by E. G. Rathbone Sr., Wellsville; W. H. Dinspel, New York City; J. J. Stietzel, New York City.

YONKERS, N. Y.—A foundry and machine shop 53 x 54 feet, brick, is to be erected for Adam Danner, Bronx river road.

BEAVER FALLS, PA.—Mack Axe Co. has been incorporated; $60,000; by John Mack, M. Mack, T. Mack and J. M. Mack.

PHILADELPHIA.—Electrical Development & Machine Co. has been incorporated; $20,000; S. C. Seymour, Camden, N. J.

PHILADELPHIA.—Connery & Co., iron and steel, has been incorporated; $50,000; by Melville B. Parker, New York. W. M. Connery, Edgar C. Aucott, Philadelphia.

PHILADELPHIA. — Consolidates Belting Co. has been incorporated; $50,000; by F. J. Torchiana, Moylan; E. T. Toogood, Orange, N. J.; E. A. Usina, Philadelphia.

PHILADELPHIA. — Supplee Biddle Hardware Co. has been incorporated; $1,000,000; by E. M. Biddle, E. M. Biddle Jr., Riverton, N. J.; James E. Baum and Richard T. Baum, Haverford, Pa.

PHILADELPHIA. — John Molitor, 1309 Walnut street, has plans in preparation for a 5-story reinforced concrete manufacturing building, 100 x 125 feet; also a 3-story reinforced concrete and brick building at Germantown, Pa.

PITTSBURGH.—The Quimby Construction Co. plans to erect a three-story brick fireproof manufacturing building here to cost about $50,000.

POTTSVILLE, PA.—The Eastern Pennsylvania Railways Co. has completed plans for a $350,000 power house at Palo Alto, construction to start in spring. W. P. Supplee is chief engineer of the power station.

SHARON, PA.—A laboratory building of the National Castings Co., Sharon, Pa., was destroyed by fire with a loss of $2,500.

SOUTH BETHLEHEM, PA.—Plans of R. E. Neumyer, bridge commission engineer, have been approved for the proposed Lehigh river bridge; cost $500,000.

CAMDEN, N. J.—Charles P. Higgin Co. has been incorporated to manufacture structural and ornamental iron, steel and wire work; $150,000; by C. P. Higgin, H. P. Forrest, C. R. Mullem, Camden, N. J.

HOBOKEN, N. J. — Hamburg-American Line is to extend its steel shed at the foot of First street, estimated cost $70,000.

NEWARK, N. J.—Newark Spring Mattress Co. has increased capital from $400,000 to $1,000,000 and will enlarge its facilities for making brass and iron beds.

NEWARK, N. J.—Clark Lorentowicz Co. has been incorporated to manufacture centrifugal and fire engine pumps; $100,000; by G. H. Clark, L. Lorentowicz, Newark, N. J.

NEWARK, N. J.—Corrugated Lock Washer Co. has been incorporated to manufacture washers, bolts, nuts, etc.; $50,000; by S. P. Heitshu, East Orange; G. A. McLean, Bethlehem, Pa.; C. Kramer, C. F. Beers, Newark.

PAULSBORO, N. J.—Schmaal Engineering Co. has been incorporated to do engineering and construction work; $500,000; by Gustav Schmaal, N. D. Schmaal, Paulsboro; Walter Rhoades White, Philadelphia.

TRENTON, N. J.—Maddock Pottery Co. is to build two structures at its plant for the manufacture of enameled ware.

TRENTON, N. J.—The John E. Thropp Sons, machinery builders, have taken a contract for equipment for a flint and spar plant. Machinery will be of special design and all motor-driven.

TRENTON, N. J.—Bids are to be taken at once on a 4-story building 60 x 170 feet, for H. M. Voorhees & Bro., to cost about $100,000. Klemann & Fowler, Trenton, architects.

WILMINGTON, DEL. — Cable Excavator Co. has been incorporated to manufacture earth-handling machines, rock crushers, engines, etc.; $100,000; by C. B. Bishop, C. J. Jacobs, H. W. Davis, Wilmington.

WILMINGTON, DEL.—The Cole-Buckhorn Machine Co. has been incorporated to sell and deal in and with seed clearing machines of all kinds; $12,500; by Herbert E. Latter, W. J. Maloney and Oscar J. Reichard, Wilmington.

BALTIMORE.—Continental Can Co. is to erect an addition 110 x 120 feet, two stories.

BALTIMORE. — Bids will be received until Jan. 7 for manhole and handbox castings for electrical commission. Raleigh C. Thomas, chief engineer.

WASHINGTON.—Bids will be received at the bureau of yards and docks until Jan. 31, for two steel towers and concrete foundations at navy yard here. Estimate $13,000.

WASHINGTON.—Plans are being prepared for a 12-story addition to the Commerce building, estimated to cost about $150,000. George A. Fuller Co., Washington, has the contract for the construction work.

WASHINGTON.—Bids will be received by the bureau of yards and docks, navy department, until Jan. 17 for reinforced concrete wharf at Annapolis, Md. Amount available $125,000.

WASHINGTON.—Bids will be received until Jan. 22 for miscellaneous scrap from the Panama canal, at the office of the general purchasing officer Isthmian Canal Commission. (Circular No. 816.)

WASHINGTON. — Proposals will be received until Jan. 12 at the office of the general purchasing agent of the Isthmian canal commission for furnishing cold-rolled steel, wire cable, chain, stove pipe, bolts, nuts, boat spikes, nails, iron washers, bronze bars, sheet brass, sheet copper, yellow metal, bronze wire cloth, brass tubing, copper tacks, plate zinc, etc. (Circular No. 814.)

CENTRAL STATES

ASHTABULA, O.—Craftsman Tool Co. has been incorporated; $30,000; by F. D. Sawdey, J. W. Beardslee, H. Leavitt, A. W. Felton and Fred L. Horton.

BRIDGEPORT, O.—Bridgeport Auto Co., recently incorporated, is to build factory here for manufacture of automobiles.

CINCINNATI.—The Neil & Smith Electric Tool Co., Cincinnati, has been incorporated with a capital stock of $30,000 to manufacture electric tools. Among the incorporators are R. K. LeBlond, C. M. Biggers, and James G. Neil, all of Cincinnati. The company will not need any equipment as this has all been purchased.

CLEVELAND.—The Belt Line Warehouse Co. will erect a four-story reinforced concrete, 150 x 340-foot warehouse in the spring at a cost of about $180,000.

CLEVELAND.—Bids will be received until Jan. 15 by William Bingham Co. for erecting an eight and 12-story mercantile building according to plans by Walker & Weeks. Estimated cost, $1,000,000. Will require about 2,200 tons of reinforcing bars.

FINDLAY, O.—United States Auto Lock Co., recently incorporated, will build a plant to manufacture a locking device for automobile gears. E. B. Brokaw is president.

GALION, O.—Galion Iron Works & Mfg. Co., just reorganized, has retained H. D. Shannon, Orrville, contractor, to start at once on addition to plant. New capital has been put into company.

GREENVILLE, O. — Greenville Electric Light & Power Co. has increased capital $30,000 to build transmission line and buy apparatus.

MARIETTA, O.—Bids will be received until Jan. 20 by Washington county commissioners for a 97-foot span steel bridge in Salem township.

MASSILLON, O.—Construction of the plant of the American Stamping & Enameling Co. at Massillon is to be started this month. The concern is removing to Massillon from Bellaire, O.

SEVILLE, O.—Union Chain & Mfg. Co. desires addresses of manufacturers of brazed, welded or butt-jointed steel tubing in 1⅜-inch diameter with ¼-inch wall, etc. Will buy in car lots.

SPRINGFIELD, O.—Bids are to be advertised by the board of education for equipment of foundry and forge room in the high school manual training department.

SPRINGFIELD, O. — National Mortising Machine Co. has been incorporated; $10,000; by G. W. Campbell, C. H. Lammert, J. J. Hartman, A. E. Overhoker.

TOLEDO, O.—The Refrigerating Machine

Co. has been incorporated; $25,000; by G. Runkel, M. E. Rowe, H. C. Adams, et al.

TOLEDO, O.—The City Machine & Tool Co. has been incorporated; $50,000; by Isaac Kinsey, L. P. Linsey and Frank L. Mulholland, Charles Hartmann, Shelto M. Douglas.

TOLEDO, O.—The Doehler Die Casting Co., Bush Terminal building, Brooklyn, N. Y., is erecting a branch factory at Toledo to manufacture bearings, castings and automobile parts.

MONONGAH, W. VA.—The Fairmont & Clarksburg Power Co., J. S. Rex, secretary, has been incorporated to build two hydro-electric plants, 10,000 and 50,000 horsepower. Plans include two concrete power dams and two hollow type reinforced concrete storage dams, total cost $280,000.

WHEELING, W. VA.—Bids will be received until Jan. 16 by Major J. P. Jervey, Corps Engineers, U. S. A., for furnishing and erecting steel lock gates and bear trap leaves for Dam 28, Ohio river.

WINCHESTER, KY.—Thomas F. Moore desires to communicate with manufacturers relative to manufacturing portable hoisting machine and derrick.

EAST CHICAGO, IND.—O. F. Jordan Co. has been incorporated to manufacture machinery; $150,000; J. H. Cummings Jr., C. Y. Freeman, F. H. Wickett, Chicago.

HAMMOND, IND.—Link Side-Bearing Co. has been incorporated to manufacture railroad trucks; $100,000; by Joseph T. Hutton, Geo. C. Locklin, Camille Gauthier, Henry W. Marden, William S. Hutton, William J. Whinery.

INDIANAPOLIS.—The Pittsburgh Valve, Foundry & Construction Co. has announced $10,000 of its capital of $1,150,000 will be utilized in Indiana.

NEWCASTLE, Ind.—The Lawter Tractor Co. is to remove its business to St. Marys, O., and occupy the plant formerly used by the Heisler Co. Agricultural power machinery is its output.

CHICAGO.—Allen Tractor Co. has been incorporated; $10,000; by Leon A. Berezniak, Mildred Peterson, H. L. Cavender.

CHICAGO.—F. C. Damm Co. has been incorporated to manufacture and repair linotype machines; $10,000; by F. C. Damm, William O. Peterson, C. H. L. Hommedieu.

GALESBURG, ILL.—Crane Mfg. Co. has been incorporated to manufacture hardware and fixtures; $5,000; by Fred Peterson, Carl Crane and Carrie Blessing.

GALESBURG, ILL.—Na-sag-gate Co. has been incorporated to manufacture farm, railroad and stockyard gates; $50,000; by Fred Peterson, Carl Crane and Carrie Blessing.

JOLIET, ILL.—Joliet Forge Co. has been incorporated; $80,000; by J. J. Sharpe, J. A. Holmes.

PEORIA, ILL.—Struthers Mfg. Co. has been incorporated to manufacture lightning rods, light fixtures, wire fence and hardware specialties; by Rubin F. Struthers, John Owens, Arthur M. Ottman.

BAY CITY, MICH.—United States Pipe Co., Battle Creek, has bought a site here and will erect factory 60 x 100 feet for manufacture of corrugated culverts.

DETROIT.—Steel King Motor Plow Co. has been incorporated; $100,000; to manufacture plows and implements; by Edwin S. George, Stanford T. Crapo, Samuel C. Mumford, William T. Barbour, H. F. Moeller.

FLINT, MICH.—Fire damaged the foundry of the United States Brass & Iron Foundry Co. $10,000. It will be rebuilt.

HOLLAND, MICH.—The Huntley Machinery Co. has been incorporated; $10,000; by Alfred Huntley, et al.

JACKSON, MICH.—Standard Electric Car Co. is being reorganized under name Standard Car Mfg. Co. with $100,000 capital.

KALAMAZOO, MICH.—The D'Arcy Spring Co. is to erect an addition, one story, 30 x 90 feet, for the manufacture of automobile springs.

ABBOTSFORD, WIS. — Faucher Nut-Lock Co. has been incorporated to manufacture nut-locks, bolts, etc.; $25,000; by A. A. Faucher, Paul Benzman. Milan, Wis.

MILWAUKEE. — National Steel Foundries has been incorporated; $5,000; by R. P. Tell, W. K. Boyle, H. P. Breed.

MILWAUKEE.—The Pennsylvania Coal & Supply Co., Caswell Block, will immediately rebuild the coal and building supply dock and hoists at the foot of National avenue, Milwaukee, which were destroyed by fire Dec. 13.

MILWAUKEE.—A new plant costing $15,000 will be erected by the Milwaukee Printers Roller Co., 372 Milwaukee street, at Greenbush and Florida streets. The building will be 50 x 140 feet in size, two stories high. Work will begin March 15. Wallace P. Allen is secretary and manager.

MILWAUKEE.—The Milwaukee Structural Steel Co. was awarded the contract for doing all the structural and ornamental iron work in the remodeling of Mozart Hall, 811 Grand avenue, into an apartment house and store building. The architects are Martin Tullgren & Son.

MILWAUKEE. — The Plankington Packing Co. has started preliminary work in preparation for the construction of its new packing plant in the Menomonee valley at a cost of $300,000. It will contain a complete new equipment of refrigerating and ice machinery. H. C. Carr is general manager.

MILWAUKEE. — The Milwaukee county board of supervisors will close bids Jan. 15 for furnishing and installing a complete electric light and power plant, and a heating and ventilating plant in the new county tuberculosis sanatorium, in the town of Wauwatosa. The sanatorium will cost $600,000. Robt. A. Messmer & Bros., Majestic building, are the designers. Louis G. Widule, county clerk, will receive bids.

OSHKOSH, WIS.—The Nathison Boat Co. is completing work on its new plant to replace the shops destroyed by fire several months ago. Some additional equipment will be purchased as needed. The company builds power boats.

PRAIRIE DU SAC, WIS.—M. W. Torkelson, Madison, state bridge engineer, has plans for a steel bridge over the Wisconsin river here. It is to be 1,400 feet long, with reinforced concrete floor. Amount available $70,000.

SUPERIOR, WIS.—The Superior Steel Plant Traction Co. intends to start work March 1 on the construction of the electric railway line from the southern city limits of Superior, along Tower avenue, to the site of the new plant of the Minnesota Steel Co. on St. Louis Bay, south of Duluth. The company has just been granted the necessary rights by the railway commission of Wisconsin. J. J. Wirtz is general manager.

WAUKESHA, WIS.—The Waukesha board of supervisors has appropriated $8,000 for the purchase of road building, rock crushing and concrete mixing machinery for state highway construction in this county.

WAUSAU, WIS. — A. C. Schmidt is promoting a company to develop red ochre beds in the vicinity of Wausau and supply paint manufacturers. It is intended to erect a large crushing and concentrating mill.

ST. LOUIS.—Medart Patent Pulley Co. has been incorporated; $350,000; to manufacture and sell pulleys, machinery and castings; by Walter R. Medart and Elise Medart, et al.

CLINTON, IA.—Bids will be received until Feb. 10 by city for reinforced concrete culverts with 66-foot roadways, at $3,000. J. G. Howes, Howes block, engineer.

WATERLOO, IA.—The Armstrong Mfg. Co. plans to erect a new plant here at an estimated cost of $50,000.

MINNEAPOLIS.—Bull Tractor Co. has been incorporated to manufacture farm tractors and engines; $1,000,000; P. J. Lyons, president; has made contract with Minneapolis Steel & Machinery Co. for 50 tractors a day.

SOUTHERN STATES

LYNCHBURG, VA. — The Lynchburg Foundry Co. will make additions and improvements in the spring.

LYNCHBURG, VA.—The National bank will erect a four-story granite and brick fireproof bank and office building here, estimated to cost about $85,000, with $40,000 additional for equipment. Alfred C. Bossom, New York City, is preparing the plans.

PULASKI, VA.—Carroll Chemical & Nodulizing Co. has been incorporated to manufacture chemicals; $300,000.

RICHMOND, VA. — Gas works officials consider expenditure of $42,574 for extensions and improvements to increase capacity to 160,000 cubic feet daily. Forestal & Robinson are consulting engineers.

JONESVILLE, N. C.—Brown-Grier Iron Works has been incorporated; $100,000; by A. L. Brown, William Brown, E. C. Grier and H. H. Barker, Elkins, N. C.

WILMINGTON, N. C.—Tidewater Power Co. plans to erect about six miles of transmission lines and buy additional apparatus. Raymond Hunt is superintendent of electrical department.

CHARLESTON, S. C.—Valk & Murdock Machine Works has been incorporated; $250,000.

GREENVILLE, S. C.—Victor Motor Car Co. has been incorporated to manufacture automobiles; $100,000; will erect plant here By A. D. Dale, Greenville.

AUGUSTA, GA.—Henry G. Kale has secured a site on Walker street, upon which he plans to erect a three-story brick and stone fireproof building estimated to cost about $25,000.

BRUNSWICK, GA. — The plant of the Bay Iron Works was burned Dec. 26, loss $12,000.

SAVANNAH, GA.—Rev. W. M. Blitch desires prices on metal ceilings.

FORT MEYERS, FLA. — Lawrence Mfg. Co. is to build a factory for manufacturing stuffing boxes for marine motors, pumps, etc., and a general machine shop. John H. Lawrence, Key West, Fla., is president.

HERNANDO, FLA.—Florida Power Co. is to build electric sub-station at this place. Will install three 500-kilovolt-ampere single-phase, water-cooled transformers stepping current from 60,000 to 11,000 volts. Six phosphate plants using power will use current stepped down to 2,200 volts.

JACKSONVILLE, FLA.—A viaduct 1,400 feet long, including approaches, is to be erected by the Johns Terminal Co. and the Seaboard Air Line. Estimated cost $100,000 to $150,000.

TAMPA, FLA.—Haney Rescue Apparatus Co. has been incorporated to manufacture automobiles, trucks, pumps and outside fire elevators; $2,000,000; will buy interests of Haney Fire Apparatus Co., Stockton, Cal., and build plant to cost $75,000 and equip with machinery to cost $75,000 to $100,000.

BREWTON, ALA.—The city plans to purchase one 150-kilowatt generator, one four-valve engine directly connected to generator, one 175-horsepower boiler and one electrically operated pump. D. B. Hayes, city clerk.

DE RIDDER, LA.—De Ridder Light & Power Co. plans to erect power plant here to cost about $30,000.

HOUSTON, TEX.—E. E. Sands, city engineer, is to prepare plans for a concrete reinforced bridge to cost $130,000.

WICHITA FALLS, TEX.—Lone Star Tool Co. has been incorporated; $20,000; by C. E. Menzie, R. A. Painter and J. Markowitz.

LITTLE ROCK, ARK.—J. K. Siphon Ventilator Co. has been incorporated to manufacture ventilating devices; $100,000.

STUTTGART, ARK.—The Arkansas Machine & Boiler Works has been incorporated; $9,000; by president, W. M. Duckett; vice president, Thomas Ryan; secretary, Harvey Towe.

CHATTANOOGA, TENN. — Chattanooga Armature Works has plans for a plant, 75 x 140 feet, one-story monitor type; steel sash windows. One 5-ton crane and a smaller crane will be required. Steam and electric power; cost about $10,000.

THOMAS, OKLA. — Ever Ready Boiler Scraper Co. recently incorporated for $100,000 by William J. Omer, J. C. Stull and Charles E. Shaw, wants prices on lathes, power punches, power drills, wire-forming machines, steam cylinders, angle iron, spring steel, etc.

WESTERN STATES

BUTTE, MONT.—Plans are completed for mill to be erected by Caroline Gold Mining & Milling Co. near Helena.

GREAT FALLS, MONT.—The American Brewing Co. will make extensive repairs and alterations and add new equipment.

GREAT FALLS, MONT.— The U. S. Reclamation Service, Great Falls, will receive bids Jan. 20 for 750,000 pounds of steel reinforcement bars.

HELENA, MONT.—With all stock paid up the Carpenter Creek Railway Co. has filed articles of incorporation for $50,000 to build a road in Musselshell county. Headquarters at Musselshell.

TRINIDAD, COL.—Fire caused $2,000 damage to the blacksmith shop at the Sopris mine of the Colorado Fuel & Iron Co. near Trinidad, Col., Dec. 27.

BLACKFOOT, IDA. — D. H. Biethan and others are planning a power plant on Warm river to generate 7,000 horsepower to supply heat, light and power to this and other towns.

BOISE, IDA.—Bids will be received until Jan. 20 for about 490,000 pounds of steel reinforcement bars for United States reclamation service. Address reclamation service, this city.

NEW MEADOWS, IDA. — W. H. Hills and B. Gustad will build hydroelectric power plant on Little Salmon river to develop about 250 kilowatts.

ST. ANTHONY.—The Utah Power & Light Co. is to build a power plant here to develop 750 horsepower.

PATEROS, WASH.—The town council is considering a plan for a municipal water system.

SEATTLE, WASH.—The council has instructed city engineer to prepare plans for large extension of water system.

SEATTLE, WASH. — National Automatic Fender Co. is planning to erect a factory on

the tide flats. A. M. Ferguson is president.

SEATTLE, WASH.—The council has voted to submit bonding proposition to the voters March 3 for acquiring Lake Cushman power site to cost approximately $2,500,000.

SEATTLE, WASH.—The Yesler Estate will erect a $100,000 hotel building at Yesler Way and Post street. A. Wickersham, Lyons building, architect.

SEATTLE, WASH.—Sound Construction & Engineering Co., Lowman building, Seattle, has been awarded contract at $80,000 for building reinforced concrete bridges over university campus here for Northern Pacific Railroad Co.

TACOMA, WASH.—The contracts for the Fifteenth and Twenty-first street steel viaducts for the Northern Pacific railway have been awarded to Widell Co., Mankato, Minn., for $250,000.

TACOMA, WASH. — Chief Engineer Holman, of Oregon-Washington Railroad & Navigation Co., says bids will be taken in January for a $375,000 steel swing bridge across city water-way. Later bids will be taken for a $125,000 freight shed.

TACOMA, WASH.—Widell Co., Mankato, Minn., has been given contract by Northern Pacific Railroad Co., at $250,000 for Fifteenth street viaduct.

KLAMATH FALLS, ORE.—The United States Department of Interior has agreed to the city council's proposal to build a permanent power plant in connection with Klamath Reclamation project. Plant will be built with city funds and government will purchase power from the city.

LA GRANDE, ORE.—Bids are being asked on the proposed Foley hotel to be erected here.

PORTLAND, ORE.—Chas. R. McCormick & Co. will build another steamer early in 1914.

PORTLAND, ORE.—The Boss Wrench Co. has been incorporated to make wrenches; $20,000; by H. P. Campbell, L. O. Thompson, H. P. Heninger.

PORTLAND, ORE.—Hill Mfg. Co. has been incorporated to manufacture machinery and toys; $1,000; by J. W. Hill, C. N. Zegler, M. F. Gardner.

PORTLAND, ORE.—Waddell & Harrington, engineers, Kansas City, Mo., have been named to plan and supervise the Pacific highway bridge across the Columbia river between here and Vancouver, Wash. The cost will exceed $1,000,000.

UMATILLA, ORE.—Plans for a municipal water system have been finished by Engineer L. C. Kelsey, Portland, and the council will submit $20,000 bond issue to the people.

ALTURAS, CALIF.—Plans have been adopted for a new court house of concrete construction, to cost $90,000.

SAN BERNARDINO, CALIF. — Southern Edison is arranging to spend $1,500,000 on an electric project on the San Bernardino range.

SAN FRANCISCO.—A bill has been introduced in the senate permitting Allan C. Rush, Los Angeles, to proceed with a suspension bridge from San Francisco to Oakland at a cost of $26,000,000.

SAN PEDRO, CAL.—The plant of the San Pedro Foundry & Machine Co. was burned Dec. 23. Insurance of $5,500 was carried on contents.

CANADA

VANCOUVER, B. C.—Bids will soon be asked by Architect J. D. E. Taylor for erecting a fertilizer plant for the J. M. Davidson Fisheries on the Skenna river. Estimated cost $125,000.

VANCOUVER, B. C.—James McElwee & Son, Denver, Colo., have been awarded a contract for 10 miles of tunnel boring for the Canadian Pacific railway in the Selkirk mountains.

VICTORIA, B. C.—McCutcheon Bros. plan to erect a six-story building on Fort street at an estimated cost of $125,000.

VICTORIA, B. C.—Plans have been completed and appropriations will be asked shortly for $2,000,000 for a printing office and museum addition to the parliament buildings.

GALT, ONT.—The Galt Knife Co., Ltd., will erect a factory, 45 x 140 feet, brick and concrete.

GODERICH, ONT.—American Road Machinery Co. is to erect a factory to cost about $90,000.

MIDLAND, ONT.—Midland Malleable Iron Co. has awarded the general contract for a foundry to the Rauff Co., Milwaukee. It will be 83 x 503 feet and will cost about $115,000.

SARNIA, ONT.—Harry Longhead is to build a two-story machine shop 24 x 63 feet at 125 Front street.

TOTTENHAM, ONT.—Coleman Fare Box Co., Ltd., is to build a factory here for the manufacture of fare boxes.

TRADE NOTES

ALLENTOWN, PA.—The Allentown Bridge Co. has increased its stock from $200,000 to $300,000.

ATHOL, MASS.—The L. S. Starrett Co., Athol, Mass., has announced to employes that a bonus of 2 per cent of their salaries will be paid all employes for the year 1913. This is the second year this plan has been followed.

BEAVER FALLS, PA.—The Ideal Tool & Mfg. Co. has increased its stock from $5,000 to $75,000.

BOSTON.—The Rivette Lathe & Grinder Co., Brighton, Boston, advises its three-story brick and concrete addition, 50 x 100 feet, is to add to its capacity for turning out its regular line of machine tools.

BRAZIL, IND.—The Crawford & McCrimmon Co. has secured a contract for furnishing castings for the Vandalia railroad shops at Terre Haute in 1914. The foundry force will be increased to meet the increased business.

CANTON, O.—The Timken-Detroit Axle Co. has reduced its capital stock from $1,000,000 to $942,500.

CANTON, O.—The Eller Mfg. Co., Canton, O., advises it is taking possession of its plant which has been under construction the past year. A site of 7 acres contains the plant, the main building of which covers about two acres. Fireproof construction has been used throughout and the office in one corner of the building is further protected by solid brick walls 15 inches thick, isolating it from the factory. New machinery has been installed, little of the old equipment being suitable as some has been in use 30 years. All machines are electric driven. "Never-Leak" skylights and "Konical" ventilators, two products of the company's shops, were used. Six cars at a time can be loaded inside the plant. Manufacturing departments are so located that goods make a complete circuit and are finished close to the lading platform. The company was started about 30 years ago by J. H. Eller and was operated as J. H. Eller & Co., but about eight years ago Mr. Eller disposed of his interest and the company was re-organized as the Eller Mfg. Co. Officers are as follows: President and treasurer, J. F. O'Dea; vice president, I. M. O'Dea; secretary, H. V. Pay; directors, G. W. Hilibish, Charles C. Bolus, I. M. O'Dea, H. V. Pay, J. F. O'Dea.

CHICAGO. — The Kultgen-Nichol Foundry Co. has changed its name to Nichol-Straight Foundry Co.

CHICAGO. — The Cassady-Fairbank Mfg. Co. advises it has bought the East Side Foundry Co., South Chicago, and moved the equipment to its main mill, 6102-6130 La Salle street. The lines formerly manufactured by the foundry company will be continued and in addition a specialty will be made of non-corrosive white metal. Casting will be done in brass, bronze, aluminum, etc., and this department will be in charge of P. D. Malloy as metallurgist.

CINCINNATI.—The Wheeler Condenser & Engineering Co., of Carteret, N. J., will open a branch office in the Fourth National Bank building, Cincinnati, after the first of the year, which will be in charge of Victor T. Price, who at present is service director of the City of Cincinnati.

CINCINNATI.—A small amount of additional machinery will probably be needed by the Cincinnati Laundry Co., which has recently been incorporated with a capital stock of $25,000. Among the incorporators are Byron L. McCormick, John Kelly and Samuel S. Church.

CINCINNATI.—E. H. Lunkens, president of the Lunkenheimer Co., says if conditions remain as good as at present or improve, the concern will let contracts within 30 days for an addition to its steel foundry at a cost of about $200,000. It is to be 100 x 220 feet, of brick, two stories and basement. Automatic conveying apparatus will be utilized.

CINCINNATI.—The following machine tool manufacturers have leased space in the Permanent Manufacturers' Exhibition building, Cincinnati, which will soon be built on the site of the Burnett House in that city, and which will be used to exhibit manufacturers' products throughout the year: The Standard Electric Tool Co., the National Machine Tool Co., the Atlas Machine Tool Co., and W. E. Scallon & Co., all of Cincinnati. The Cincinnati Artistic Wrought Iron Works, of Cincinnati, has also applied for space.

CLEVELAND.—The J. W. Frazier Co., engineers, has removed its offices from the Rockefeller building to the twelfth floor of the Illuminating Co.'s building, Cleveland.

EASTON, PA.—The Lehigh Valley Foundries & Mfg. Co. announces that in order to meet demands of business the Gallagher Carburetor Co., Inc., 1876 Broadway, New York City, has bought the Edwards & Smith Co. foundries at Easton, to operate under the name of the Lehigh Valley Foundries & Mfg. Co. The output will be Gallagher carburetors, strainers, shock absorbers, special valves, and brass and aluminum castings of all kinds.

PERSONALS

JOHN H. DAVIS has resigned his place as director and general manager of the Standard Steel Castings Co., Cleveland, O.

LEWIS NIXON, the ship builder, has been appointed consulting engineer and commissioner of public works of the borough of Richmond, New York City.

W. H. SHAFER, formerly connected with the Cincinnati Bickford Tool Co., but more recently with the Rochester Boring Machine Co., has again become associated with the former company as a special representative in connection with its selling organization.

L. P. ROSS, general manager of the Northern Iron Co., operating blast furnaces at Port Henry and Standish, N. Y., was, on Christmas day, presented by the employes of the Standish plant, a handsome silver coffe service, which was tastefully and appropriately engraved.

E. M. CHADWICK, formerly with the Fairbanks Co., has been appointed manager of the Buffalo branch of Manning, Maxwell & Moore, dealers in railway and machinists' tools and supplies and electric traveling cranes; and D. A. Hamilton, formerly with the Reed-Prentice Co., Worcester, has been appointed assistant at Manning, Maxwell & Moore's Detroit branch.

J. P. MORGAN, Chas. Steele, H. P. Davison, W. H. Porter and T. W. Lamont, members of the banking firm of J. P. Morgan & Co., have severed their connections as directors of a number of railroad, banking and industrial companies. Mr. Steele retires as a director of the United States Steel Corporation, but Mr. Morgan remains upon the board of that Corporation. Mr. Steele remains a director of the General Electric Co. and of the International Harvester Co. Mr. Lamont has resigned as a director of the Westinghouse Electric & Mfg. Co., but continues on the board of the International Harvester Co. The other companies affected by these changes include a score of railroad, banking, industrial and various other corporations.

HENRY TANNER PRATT, manager of sales of the American Steel & Wire Co. in the Cleveland district, was guest of honor Saturday evening, Jan. 3, at the Chicago Athletic Club, when a dinner was given him by the sales managers and department managers of the company. About 45 were present, including representatives from New York, St. Paul, Chicago, Denver, St. Louis, Cincinnati, Cleveland, Detroit and Worcester. Mr. Pratt is about to start for Florida, to spend the winter, and his associates decided to give him a good send-off. Mr. D. A. Merriman, assistant general sales agent, presided and there were numerous informal toasts, all of the men speaking in terms of the highest praise of Mr. Pratt. The climax came when Frank Baackes, vice president and general manager of sales of the company, took the floor and in an exceedingly happy address, in which the long and efficient service of Mr. Pratt was reviewed, presented him a handsome gold watch. Mr. Pratt responded, expressing his gratitude not only for the entirely unexpected present, but also for the many years of happy association which he had had with men of the wire business. He gave some reminiscences of his service which extended over 20 years preceding the organization of the Steel Corporation with the Washburn & Moen Mfg. Co., at Worcester, and continued from 1901 with the American Steel & Wire Co. Mr. Pratt leaves for Florida, Thursday.

The Production *of* Malleable Castings

By RICHARD MOLDENKE

A practical treatise on the processes involved in the manufacture of Malleable Cast Iron.

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Construction and Operation of the Open-Hearth Furnace.
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The Use of Condensers for Economizing Steam

(*Continued from page* 116)

in which case the additional ½ pound must be due to the presence of some other vapor or gas, such as air.

The amount of air present is easily calculated from Boyle's and Mariotte's laws, namely, that at constant temperature the pressure of the gas varies inversely as its volume and that at constant volume the pressure varies as the temperature measured from the absolute zero, namely, 463 degrees Fahr. Combining the two laws, we have the formula, $P \times V = R \times T$, in which if P is pounds per square inch, V cubic feet per pound of gas and T absolute degrees temperature, the constant, R, will be equal to 37.

With this explanation, let us return to the consideration of what goes on in the condenser. At the inlet opening we have a constant inflow of practically pure water vapor with only a very small, almost negligible percentage of air. This vapor, upon striking the cold circulating water, rapidly condenses, becoming richer in air until, at the extreme farthest part of the condenser, we have a mixture of which air constitutes an important part. How much water vapor and how much air there will be in a cubic foot of the mixture at the farthest point, which should be the location of the air pump suction, we can determine if we know the total pressure in the condenser and the temperature at the air pump suction. The pressure is practically uniform throughout the condenser. Let us suppose that it is 1½ pounds per square inch, as assumed above, then the temperature at the inlet where there is practically pure water vapor will be 115 degrees Fahr. Assume that the temperature of the mixture of the air pump suction is 60 degrees Fahr. From the steam table we readily determine the weight of a cubic foot of steam at 60 degrees Fahr. as 0.000828 pound, and the pressure corresponding to 60 degrees Fahr., or 1¼ pounds. Subtracting this from 1½ pounds, the total pressure, we get the partial pressure of the air; then, knowing its temperature and volume, we obtain its weight. As a cubic foot of air at 60 degrees Fahr. and 14.7 pounds per square inch pressure weighs 0.076 pound, we can calculate, by means of the above formula, that each cubic foot of the mixture will contain 0.000645 pound of air, and it will be seen that the air pump capacity required is determined solely by the number of pounds of air entering the condenser per minute, and the temperature and pressure at which the mixture is withdrawn. A high vacuum is impossible without a cold air pump suction and a hot air pump necessarily implies a low vacuum.

To recapitulate, we need, in order to obtain high vacuum, the following:

1.—Sufficient cooling water to abstract the latent heat of the steam.

2.—Such construction of the condenser as will insure ready transmission of heat from steam to water and full utilization of all the water.

3.—The withdrawal of the air where it is coldest and where the proportion of air to steam is greatest, and

4.—Sufficient air pump displacement to dispose of the mixture of air and uncondensed vapor.

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(*Continued from page* 119)

ply of girders, joists, uprights, etc., and reinforced concrete is becoming the favorite material for all large erections.

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